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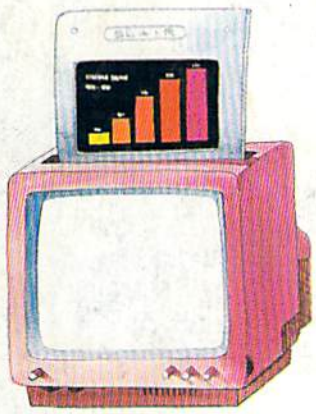

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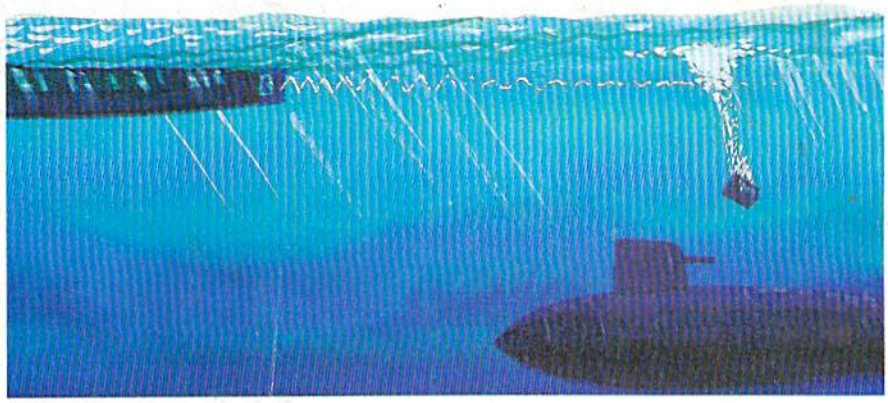

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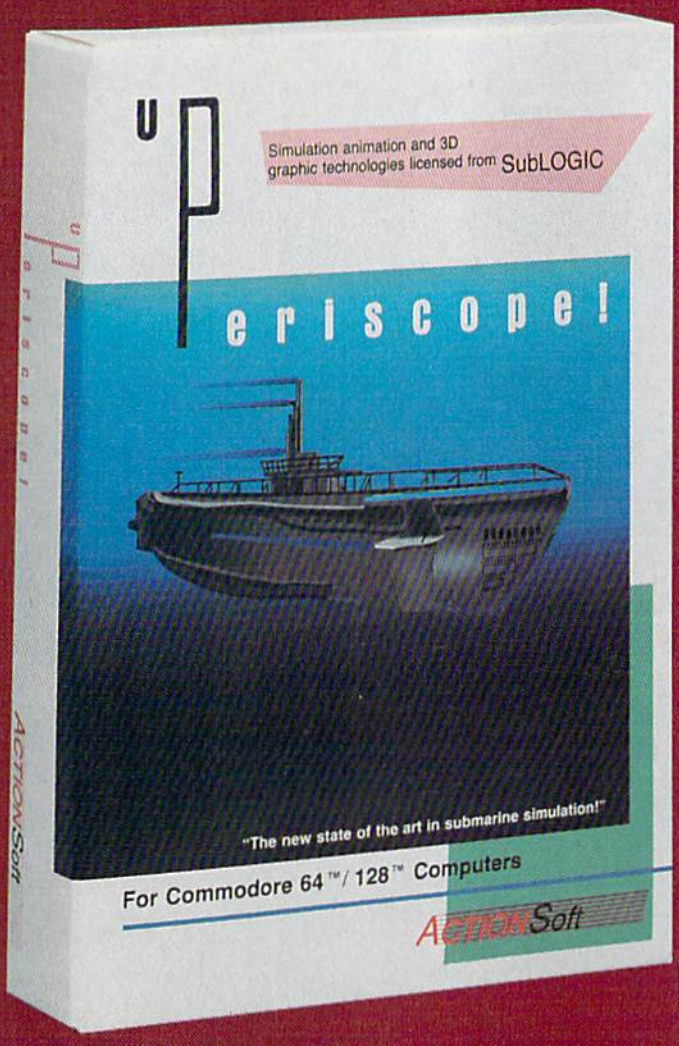
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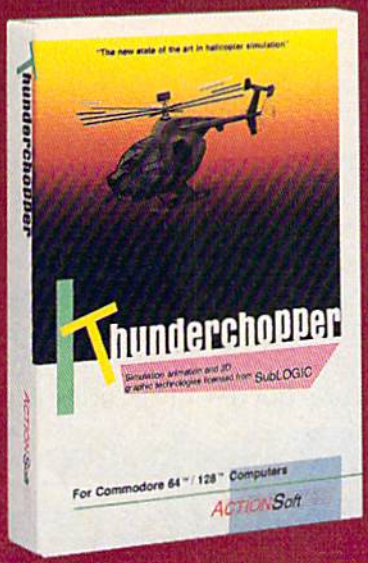

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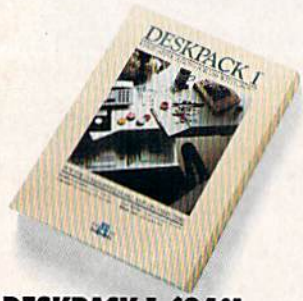

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COMPUTE!'s GAZETTE is published monthly by **COMPUTE!** Publications, Inc., 825 7th Avenue, New York, NY 10019 USA. Phone: (212) 265-8360. Editorial offices are located at 324 West Wendover Avenue, Greensboro, NC 27408. Domestic Subscriptions: 12 issues, $24. POSTMASTER: Send address changes to *COMPUTE!'s GAZETTE*, P.O. Box 10957, Des Moines, IA 50340. Second class application pending at Greensboro, NC 27403 and additional mailing offices. Entire contents copyright ©1987 by **COMPUTE!** Publications, Inc. All rights reserved. ISSN 0737-3716.

COMPUTE! Publications, Inc. is part of ABC Consumer Magazines, Inc., one of the ABC Publishing Companies: ABC Publishing, President, Robert G. Burton; 1330 Avenue of the Americas; New York, New York 10019.

editor's notes

There's been considerable press coverage lately of laser printers and desktop publishing. In fact, entire magazines are now devoted to the subject. And, with their prices falling below $2,000 and poised to plunge even further, these new printers are threatening to become the standard, replacing daisywheel and dot-matrix technology. With personal copiers as low as $500, there's no reason why we won't see laser printers selling at that price in a year or two. When that happens, few computer owners will be able to resist them.

To understand the appeal of laser printers, it's helpful to consider the range of print quality available—from typed mimeographs, through 27-pin dot-matrix, to typesetting. Smudged, hazy mimeographs are simply difficult to read. The lines are thick, the space inside letters like *e* is often filled in, letters resemble each other, they lose their individuality. As a result, you have to work sometimes to recognize the words on the page.

A step up is typewritten text made with clean keys and a good ribbon. But even here, the letters all have similar shapes, are all equally spaced apart (*i* takes up as much room as *w*), and the reader is burdened with less quickly recognized individual letters. We are forced to slow down when reading typewritten material because it, too, suffers from what in television sets would be called poor resolution. Daisywheel printers are simply typewriters attached to computers. Dot-matrix printers, even though they've become quite sophisticated, produce text that is fuzzier than a daisywheel's.

This magazine, like most magazines and books, is typeset. If you take a close look at the letters, you'll see how much variety there is in the width of their lines, in their shapes, sizes, and spacing. Add to this their high resolution, their crisp edges, and you can quickly understand why, for most publications, typeset text is the preferred medium. Not only can you read it for longer periods of time without fatigue, you also can read it more quickly and more accurately. The distinction between mimeographed or photocopied, typewriter-quality print and typeset print is quite similar to the distinction between reading computer output on an ordinary TV and reading it on a high-resolution monitor.

A laser printer produces text just a step below typeset quality. If you look closely at very large headlines, you can see some ragged edges on curved letters such as *s*. But you do have to look closely. Currently popular laser printers feature 300-dot-per-inch resolution. You'd be hard-pressed to tell that smaller letters weren't typeset.

Other benefits of laser printers are reminiscent of the advantages word processing offers over straight typing—far greater control over the final result. For one thing, you can create and insert graphics. Changing fonts is as simple as inserting a command code into a word processor document, just as you would when changing to italics. A font change produces an entirely new set of differently designed characters. Most laser printers come with several standard fonts built in, including a font which closely resembles the letters on this page. They also include real italics, different sizes of letters, and special symbols. For example, if you were reproducing this page, you could create the ordinary text, then the lines at the top, and, finally, switch fonts and print the words *editor's notes* as they appear above. Specialized fonts such as old English script or foreign languages are also available as plug-in cartridges or on disk as downloadable software.

But we've only touched on the features and advantages of this new printing technology. Laser printers are also quick (an average of eight pages per minute) and as quiet as a copier. They can make the letters you write, the articles you send to Gazette, the papers you turn in to your teacher or boss look about as good as printing gets.

Richard Mansfield
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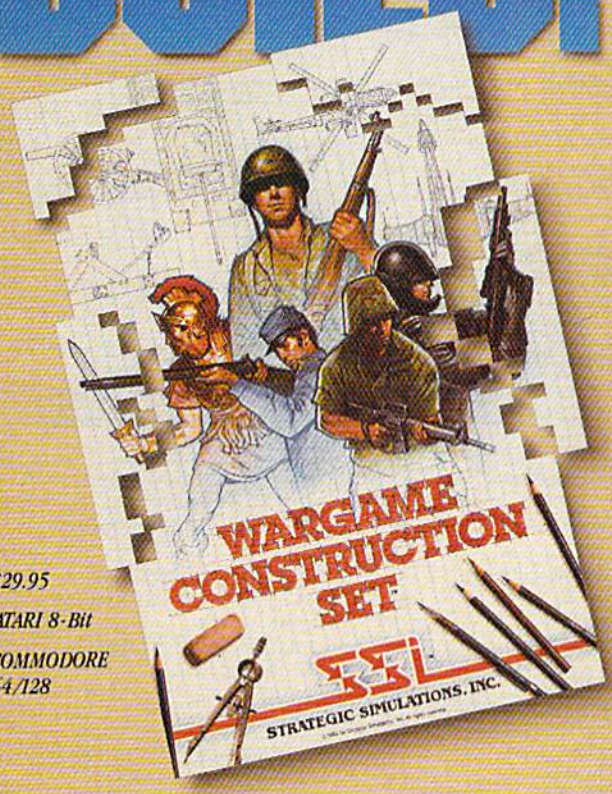

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Do you have a question or a problem? Have you discovered something that could help other Commodore users? We want to hear from you. Write to Gazette Feedback, COMPUTE!'s Gazette, P.O. Box 5406, Greensboro, NC 27403. We regret that, due to the volume of mail received, we cannot respond individually to programming questions.

Prize Winner

Here is a letter we received from the grand prize winner of last year's Dream Computer Sweepstakes, a direct-mail disk-subscription contest for subscribers of Gazette and COMPUTE! magazines. Karen Cleary, the winner, was awarded $3,000. For information on a new $5,000 Gazette sweepstakes, see page 101.

I want to thank you for having the Sweepstakes contest. Needless to say, I was more than a little surprised and elated. We had been talking about upgrading our home computer for some time, but nothing substantial ever came of our talks until recently. We bought a Leading Edge Model D turbo with a 20-meg hard drive and an internal Hayes-compatible 1200-baud modem, and a Citizen MSP-10 printer for our work. For the lighter side we bought an Atari 1040 ST. Thank you for making our "talk" a reality.

Karen M. Cleary

A Supine Mouse

Can an Atari trackball be used with GEOS instead of a mouse?

D. W. MacNab

When mice first appeared as peripheral devices, they were sometimes described as being like upside-down trackballs. Since that time, mice have become popular and trackballs have faded from view.

The answer to your question is a qualified yes. *Atari trackballs work in two different modes that can be selected with a switch on the bottom of the case. The first mode emulates a joystick. So the trackball can be used with* GEOS*—just use the joystick driver. Like Commodore's new 1531 mouse, the Atari trackball also offers a true proportional mode, but it's different enough that it doesn't operate with the mouse driver included with* GEOS 1.3. *Theoretically, a driver could be written to allow trackballs to be used with* GEOS, *but we haven't seen one yet.*

Cursors, Foiled Again

I've never seen an article on the lowly cursor. How about a relocatable ML routine for the 64 that would replace the old, boxy cursor with a sleek, underline cursor? CHR$(164) would be perfect.

William A. Jones

On the 64, the cursor isn't really a character you can reprogram. When you press the cursor keys and watch the blinking cursor move to and fro, it might seem to be a character, like an A *or a* Z. *It's not.*

Two memory locations keep track of the current cursor position (its column and row). When the time comes to blink the cursor, the computer finds out which character occupies that particular screen location, and replaces the normal character with the reversed character shape. A little later, to turn off the cursor, the reversed character is replaced by the normal character shape. The system handles the cursor blinking by switching reversed and normal characters back and forth.

To change the cursor to an underline, it's necessary to replace the entire set of reversed characters with underlined characters. Before running the following program for the 64, you must enter ***POKE 642,48: SYS 58260****—this resets the beginning of BASIC and prevents BASIC and the new character set from interfering with each other.*

```
10 C1=8192:C2=9216:C3=10240
   :C4=11264
20 POKE56333,127:POKE1,51
30 FORJ=0TO1023:UC=PEEK(532
   48+J):LC=PEEK(55296+J)
40 POKEC1+J,UC:POKEC2+J,UC:
   POKEC3+J,LC:POKEC4+J,LC:
   NEXT
50 POKE1,55:POKE56333,129
60 FORJ=C2+7TOC3STEP8:POKEJ
   ,255:POKEJ+2048,255:NEXT
70 POKE53272,(PEEK(53272)AN
   D240)OR8
```

The price you pay for the underline cursor is that you lose the reversed character shapes. If you press CTRL-9 (RVS ON) *and type some characters, you'll see underlined characters instead.*

Pressing RUN/STOP–RESTORE *turns off the custom characters. To turn them back on, reenter the final line from the program above:* ***POKE 53272, (PEEK (53272) AND 240) OR 8.***

The 128's 80-column screen has a programmable cursor. Press and release the ESCape *key (don't hold it down) and then press the* U *key to switch to an underline cursor.* ESC-S *sets it back to the block cursor.* ESC-E *disables cursor blinking and* ESC-F *turns it back on.*

Doing The Shuffle

I am writing a program on the 64 that deals a deck of cards. How do I randomly choose cards, yet keep track of which ones I use? The cards are numbered 0–9 with four colors.

Monte Ohrt

With 10 cards (numbered 0–9) and four colors, your deck contains 40 cards. In the program below, the cards are numbered 0–39, where cards 0–9 are blue, 10–19 are red, and so on. To find the color, divide by 10 and use the INTeger value of the answer, which will range from 0 to 3. Then multiply that number by 10 and subtract it from the card number. For example, 24 divided by 10 is 2 (the color) with a remainder of 4 (the face value).

You may employ two techniques to make sure no cards are duplicated in a deal. The first is to generate a random number, then look back at the previously chosen cards to see whether that number has already been selected. This works well for a few cards. But as the list gets longer, the chances of duplication greatly increase. For example, if every card except the twenty-first has been picked, you have only a 2.5 percent chance (1 out of 40) that you'll randomly choose a 21. The double-checking loop might have to repeat a few dozen times, which would slow down the program considerably.

A second, and better, technique is to create an array that's numbered 0–39. Before the main part of the program begins, initialize the array so that C(0) holds a 0, C(1) holds a 1, C(2) holds a 2, and so on up to C(39), which holds a 39. Now you have a list of 40 numbers, and each card appears only once in the array. Before

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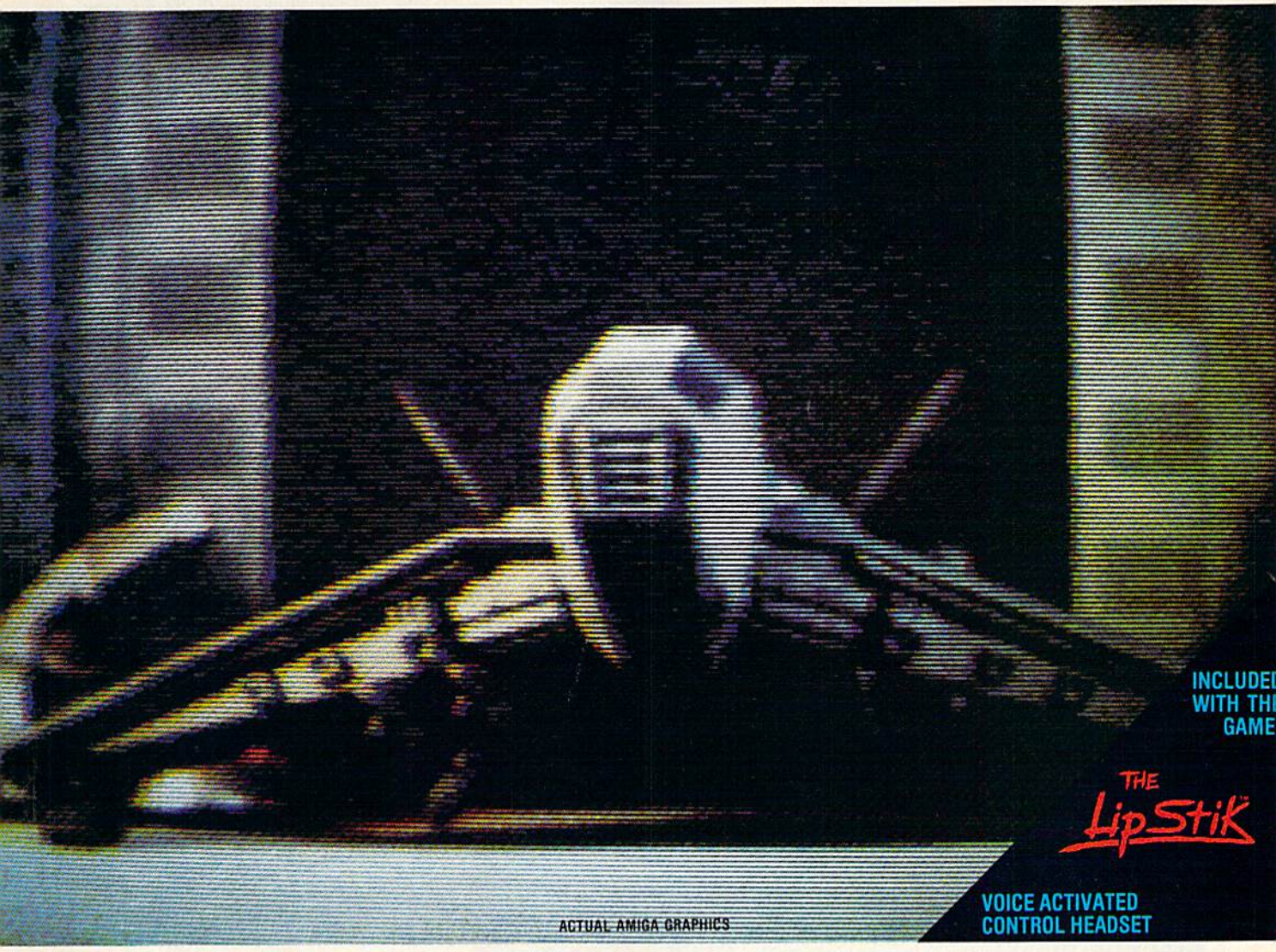

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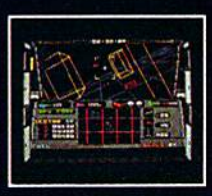

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dealing out the cards, shuffle the array by randomly swapping cards. If you step through the list, you know in advance that once you pick a number, it will never appear again.

```
BF  5 POKE53281,15
AR  10 DIMS$(3),C(39),H(4,1)
QD  15 Z=RND(-TI/113)
SG  20 FORZ=0TO3:READA,B:S$(Z)=
       CHR$(A)+CHR$(B):NEXT
BS  30 DATA 31,193,28,211,5,218
       ,144,216:REM BLUE,SPADE,
       RED,HEART,ETC.
MF  40 FORZ=0TO39:C(Z)=Z:NEXT:R
       EM INITIALIZE ARRAY
KB  50 GOSUB1000:REM SHUFFLE
GH  60 P=0: REM ZERO THE POINTE
       R
RE  70 FORY=0TO4:FORZ=0TO1:H(Y,
       Z)=C(P):P=P+1:NEXT:NEXT:
       REM DEAL THE CARDS
MF  80 GOSUB2000:REM PRINT THE
       {SPACE}CARDS
AQ  85 GETA$:IFA$=""THEN85
KG  90 IF P<25THEN70:REM DON'T
       {SPACE}SHUFFLE
CX 100 GOTO50: REM TIME TO SHU
       FFLE
FB 1000 PRINT"{CLR}{GRN}SHUFFL
       ING..."
AP 1010 FORY=0TO(RND(1)*5+1):F
       ORZ=0TO39:A=INT(RND(1)
       *40)
AA 1020 T=C(A):C(A)=C(Z):C(Z)=
       T:REM SWAP TWO CARDS
BR 1030 NEXT:NEXT:RETURN
RS 2000 PRINT"{CLR}";
JE 2010 FORY=0TO1:PRINT"{PUR}
       {RVS}PLAYER";Y
CD 2020 FORZ=0TO4:D=H(Z,Y):DS=
       INT(D/10):DC=D-DS*10:P
       RINT,S$(DS);DC
MD 2030 NEXT:NEXT:RETURN
```

Lines 20–40 initialize the arrays. The shuffling subroutine starts at line 1000. The printing routine starts at 2000. Line 70 deals the cards by copying numbers from the C(39) array to each of the two players' hands—the H(4,1) array. Players 0 and 1 are dealt 5 cards each. The deck is reused until more than 25 cards have been dealt (line 90), after which the array is shuffled again.

Converting To 80 Columns?

I have read that the 8563 video chip used in the 128 gives 80 columns of text. If I install this chip in my 64, will it have any effect on the graphics or on the games my children play? Will I see a difference other than when using word processors?

If I can put this chip into my computer, what chip will it replace?

Fred Occhiuto

The 128 has two video chips. The first, the VIC chip, is similar to the chip that is used in the 64 (the 128's VIC chip has two extra registers). It is responsible for the graphics modes and 40-column text modes that are so familiar to the users of 64s and 128s alike.

The second video chip, the VDC (formally designated the 8563), is used by the 128 to provide an 80-column text mode. An 80-column monitor must be used in order for you to be able to see the video output from the chip.

The two chips are not interchangeable, either electrically or logically. Even if you could manage to hook the chip up to your computer, you still couldn't use it because the operating system of the 64 doesn't contain the software that is needed to access the chip.

The easiest way (and the only 128-compatible way) to upgrade to 80 columns is to buy a 128.

Making Backups

I subscribe to the GAZETTE Disk, and I am having a problem. I cannot seem to move machine language programs from the GAZETTE Disk to my own disks. I would appreciate any help you could give me.

Robert M. O'Connor

It's a good idea to make backup copies of the programs on the GAZETTE Disk. There are several ways to do this. Recent versions of the Test/Demo *disk that comes with Commodore disk drives contain a program called "Unicopy," which can copy any file from one disk to another. Similar programs are available commercially.*

If you know the starting and ending addresses of the program (these can be found in the article which corresponds to the program), you can load the program from the GAZETTE Disk using the "MLX" machine language entry program in GAZETTE, and then save it back out to another disk.

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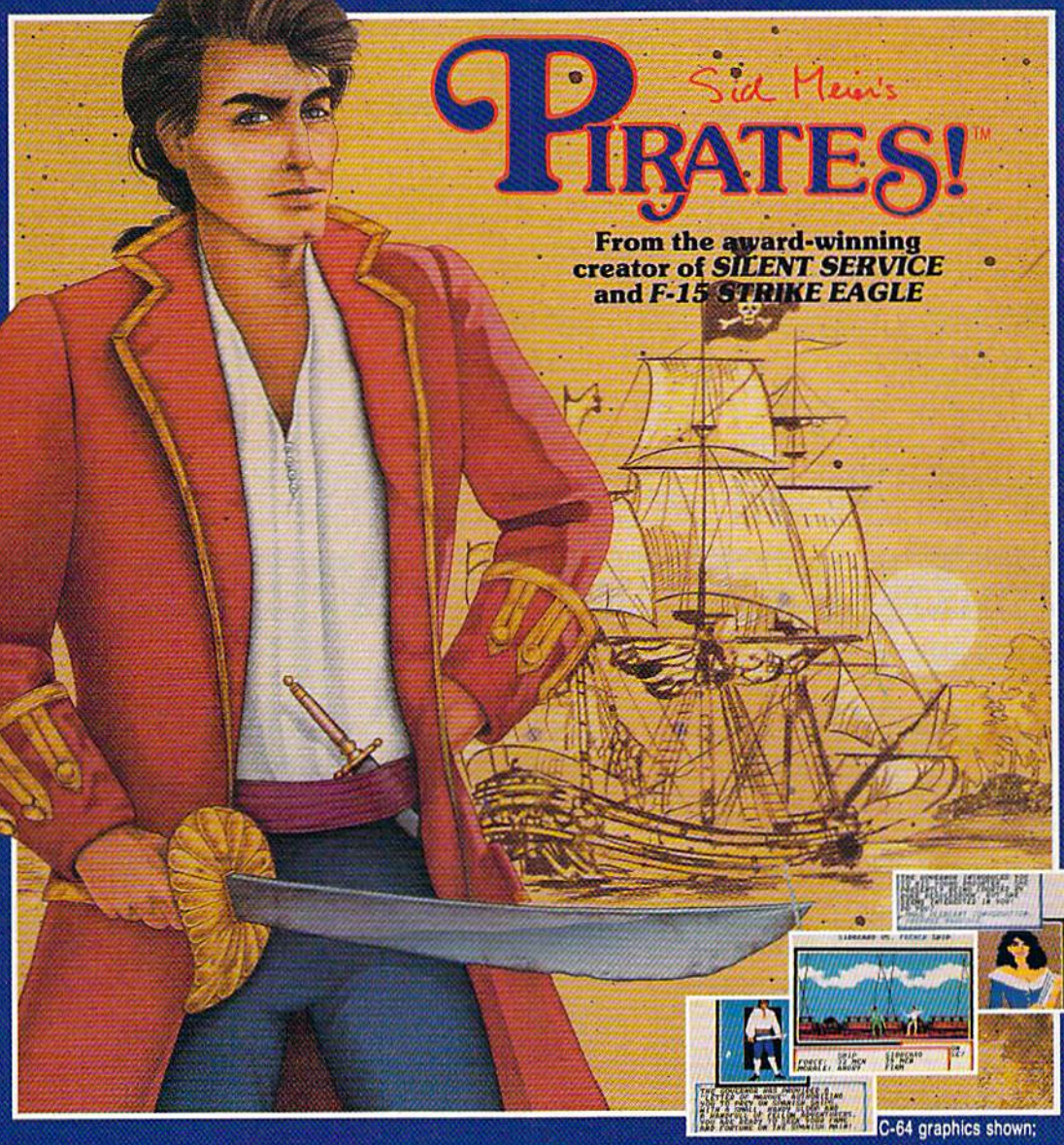

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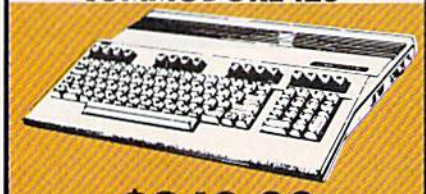

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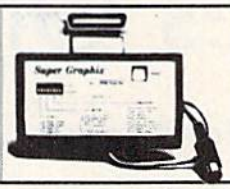

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CES: Commodore Software Comes Of Age

Keith Ferrell, Features Editor

Commodore was not in attendance at this year's Summer Consumer Electronics Show (CES) in early June, but many of its machines were on display, running many new, impressive programs—software that more than ever before exploits the capabilities of the Commodore 64 and 128. Whether for entertainment or productivity, software at this year's CES was perhaps more of a Commodore show than it has been in several seasons.

The Summer Consumer Electronics Show (CES) in Chicago draws more than 100,000 people for several days of salesmanship, product announcements, hype and hoopla, publicity, and predictions—all of it aimed at showing distributors and retailers everything that's new in electronic products intended for the large consumer market.

CES is the place where trends can be spotted ahead of time and where you can find the latest model digital televisions, compact disc players, telephones and answering machines of every conceivable type, radios, recorders, clocks, calculators, and whatnot, all being displayed, demonstrated, and promoted under one roof. It's quite a show.

Nowhere else can you find quite so clear a picture of just how important computers and software are to the electronics industry. At this year's summer CES, personal computers and the software they run occupied almost 15 percent of the display space and captured an even larger percentage of the attendees' attention.

Where's Commodore?

Although Commodore elected not to exhibit at this Summer's Consumer Electronics Show, it had perhaps as many computers on display as anyone there. Commodore 64s and 128s could be found at virtually every software developer's booth, running the latest entertainment, education, and productivity software. This year's crop of Commodore software includes flight simulators that fly higher, combat programs that fight harder, racing software that comes close to putting you behind an actual wheel, text and narrative games that really do have stories and characters, and productivity packages that turn the 64 into a powerful desktop publisher.

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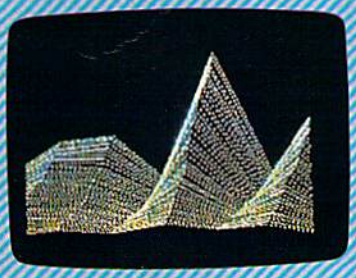

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Here and there the same old rumors about the imminent demise of the 64 or the 128 were overheard and, prompted by the corporate shakeup at Commodore just a few weeks before CES, there were even a few rumors about the possible imminent demise of the company itself.

But Commodore—exhibiting in Atlanta at the Computer Dealers' Exposition (COMDEX) the same weekend—had a few surprises in store. A rush of relief raced through CES when early word came from Atlanta of Commodore's bold stand for its new Amiga and of price cuts on its PC compatible. (See "COMDEX: The Amiga 500 Heads for Home," accompanying this article.) And this relief was accompanied by an almost palpable sense of excitement, a feeling that the company is *moving* again, a force once more ready to be reckoned with.

The 64 and 128? Neither machine was on view at Commodore's Atlanta display, but in view of an installed base of over seven million 64s and more than a million 128s, those Chicago rumors about an early demise evaporated quickly. Few software developers, in fact, felt that anything could affect the 64's position as the focus of the entertainment software industry.

The 64 Forever

"Firebird will support the 64 until it dies," proclaimed Martin Davies, Firebird's president of North American Operations. "In fact, we'll continue to support it after it dies—not that we think it ever will. And there's more to this than just the number of machines out there—fact is, the 64 is a terrific machine to develop for."

Davies, whose company has achieved much success importing English programs such as *Elite*, feels that there remains a lot of potential for extending the capabilities of 64 software. "Part of this is the fact that the English software industry is still cassette tape–oriented. Our writers and developers have to learn how to compress their programs. That compression translates into complex, detailed, fast programs for disk drives here."

Equally enthusiastic about the 64's potential is Michael Harrison, communications director for MicroProse, another successful software company. "We've reached the point where there's not only a large base of installed machines, but also a big base of programming techniques and abilities to draw from. Certainly at MicroProse we're continuing to focus all initial development on the 64; then we'll adapt the programs to other systems."

There was an air of excitement at Epyx as well. The company feels that Commodore machines span the spectrum of software users, and it is adjusting its marketing plans accordingly. "We've got a product line that offers something for the first-time 64 user, for children, for budget-conscious buyers, and for the advanced, experienced gamer," said Bob Botch, vice president of Epyx. While Botch foresees a neck-and-neck MS-DOS/Commodore software market perhaps as early as the fourth quarter of this year, he also perceives them as being different markets—MS-DOS machines are not robbing the 64 base.

A Productivity Machine

Perhaps nowhere was the continued broadening of the 64's appeal more in evidence than at the Berkeley Softworks booth. Having established *GEOS* as the standard external operating system for the 64, the company further extended that machine's usefulness with the introduction of *geoPublish*, a full-featured desktop programming application for the 64.

Brian Dougherty, Berkeley's CEO, noted that the $69.95 program achieves 80 to 90 percent of the functionality of such popular desktop publishing packages as Aldus' *Pagemaker* for the Macintosh and the IBM PC.

geoPublish permits the formatting of pages on the Commodore 64, so that users can create multiple columns on multiple pages and the software will automatically align text in the selected column format. Font style and size are selected at the keyboard, and text reconfigures itself to adjust for graphics or alterations in layout.

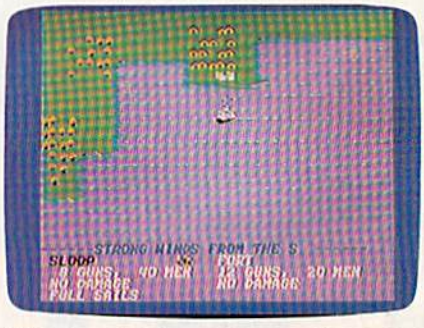
Timeworks is another company approaching desktop publishing for the Commodore market. *The Timeworks Desktop Publisher* offers "WYSIWYG" (What-You-See-Is-What-You-Get) capabilities in word processing, page design and layout, drawing, and importation of graphics onto the printed page.

Games And Graphics

Software developers revealed an increasing determination to expand the 64's game capabilities, with advances announced in every type of entertainment product.

One area that many developers see as an opportunity is the addition of narrative structures to what would otherwise be arcade games. Michael Harrison of MicroProse noted that the company's games, such as the upcoming *Project Stealth Fighter* flight simulator, would feature increasingly detailed mission scenarios, with the circumstances surrounding the missions featured along with the mission objectives. Closer to pure arcade action, the company announced *Airborne Ranger*, which puts players in the position of a paratrooper dropped behind enemy lines on a dangerous mission.

"We're also proud of *Pirates*, which is something new for us," Harrison said. The game recreates the Caribbean in the eighteenth century, the era of buccaneers, combining arcade action with a menu-driven text adventure. To escape indenture, you become a pirate. The program features arcadelike tests of navigation, fencing, and ship-to-ship combat.



MicroProse's Pirates *is a graphics-and-text arcade adventure for the 64.*

Farther down the road for MicroProse is *Red Storm Rising*, the software version of Tom Clancy's bestselling novel of a nonnuclear, European-theater war in the near future. Clancy himself is participating in the design of the program, which is expected to be released early in 1988.

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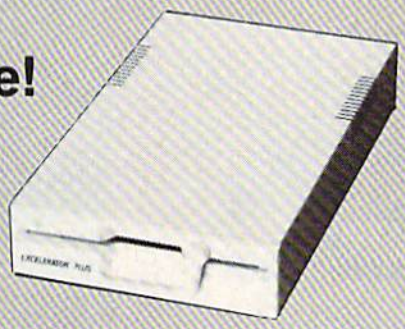

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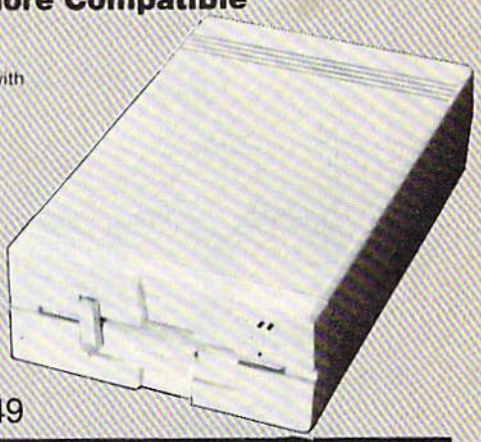

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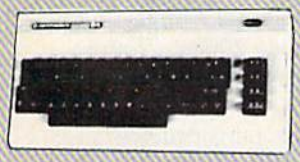

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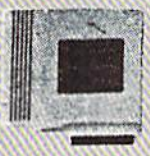

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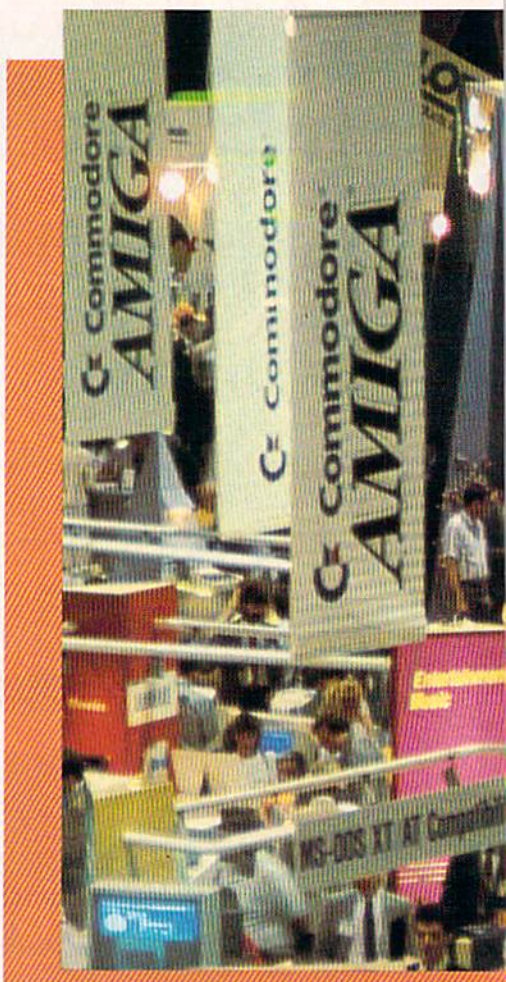
COMDEX: The Amiga 500 Heads For Home



Selby Bateman, Associate Publisher

When Commodore Business Machines introduced the 64 computer in 1982, the machine cost $600 without a monitor. Consumers had the chance to buy a remarkable personal computer with some of the most advanced sound and graphics capabilities then available. As everyone knows, the 64 went on to become a phenomenally successful personal computer, with more than seven million sold. And it hasn't stopped yet.

Now, five years later, Commodore has introduced another personal computer with state-of-the art graphics and sound: the new Amiga 500. For just one hundred dollars more than the 64 originally cost, the Amiga 500 features a half-megabyte of memory (512K—eight times the memory of the Commodore 64), a built-in disk drive, stereo sound, and superb color graphics. With that price and those capabilities, there's little doubt that the 500 is headed directly for the same home market that has been so successful for the 64 and 128.

That was the message Commodore made quite clear at this summer's COMDEX in Atlanta. With a large booth jammed full of the original Amiga 1000s and the new 500s and powerhouse 2000s, Commodore indicated its intentions to make the Amiga 500 the next Commodore 64.

"With the acclaimed Amiga performance and the price point of $699, the A500 will aggressively drive the home market segment," said Alfred Duncan, Commodore's new general manager.

Commodore's future rests on the success of the Amiga family of computers. At the same time, the 64 and 128 machines continue to sell very well without the push provided by trade shows like CES and COMDEX. Therefore, Commodore decided against displaying its computers at CES and opted for a strong Amiga showing at COMDEX.

Apparently, the decision was the right one. Commodore's booth was crowded with software developers showing a wealth of new Amiga products, and the mood was definitely upbeat as the exhibitors contemplated Commodore's renewal of aggressive marketing aimed at both the home and business markets.

Commodore's exhibit booth at COMDEX in Atlanta was a showcase for both the new Amiga 500 and the new 2000 computers.

Amiga Evolution

The original Amiga, dubbed the A1000, was introduced during the summer of 1985 and was immediately recognized as a quantum leap forward in personal computers. During the next 18 months, the Amiga 1000 sold well, but not at the rate that many people had hoped. Some critics complained that the computer was priced too high ($1,295 for a 256K Amiga 1000 without monitor), while others argued that it was too limited to make it in the business and vertical markets. This past spring, however, Commodore announced that two new Amigas, the 500 ($699 for 512K without monitor) and the 2000 ($1,995 for 1 megabyte and no monitor), would be introduced; the former aimed at the home market, and the latter directed toward business and vertical market applications such as desktop publishing and video production.

For those not familiar with the Amigas, a few specifications will reveal just how versatile and powerful these machines are. The basics of the Amiga 500, 1000, and 2000 computers are the same:

* Motorola 68000 microprocessor running at just over seven megahertz, the same chip found in the Macintosh and the Atari ST computers.

* Three custom chips, nicknamed Portia, Daphne, and Agnes, for sound, input/output, memory access, and animation and graphics.

* Four screen resolutions, ranging from 320 × 200 to 640 × 400, with the capacity to display 4096 colors simultaneously.

* Four-voice, nine-octave stereo sound, with two RCA audio output jacks.

* A true multitasking operating system.

* The Workbench icon-based user interface, with pull-down menus, screen windows, and multiple screens.

The Amiga 500 comes with 512K of memory that can be expanded by the user to one megabyte with an optional expansion card. The 500 is also expandable up to nine megabytes of contiguous RAM. An 800K double-sided 3½-inch disk drive is built into the right side of the 500, and there's an expanded keyboard with separate cursor and numeric keypads. The Kickstart 1.2 operating system, which on the 1000 is loaded from disk, is built into ROM on both the 500 and the 2000 Amigas.

The 500, unlike the 1000, has industry standard RS232 serial and Centronics parallel ports, which permits the machine to use IBM PC modem and printer cables.

Commodore hopes that its new Amiga 500 will be as successful a home computer as the Commodore 64.

The Professional 2000

While Commodore is betting that the Amiga 500's power and price will be too impressive for consumers to resist, the company is looking to its new 2000 to break into a variety of different business and

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The 2000 comes with a minimum of one megabyte of memory that's expandable to nine. What really sets it apart, however, is its seven full-size internal expansion slots configured for either Amiga or standard PC/XT/AT cards. With the optional Bridgecard mounted inside, the Amiga 2000 is able to run IBM software at the same time it's running Amiga programs, with no loss of speed. The machine also comes with a video expansion slot, another expansion slot for a 68020 microprocessor and/or a math coprocessor chip, and the industry-standard serial and parallel ports. The front section of the 2000's system box has space for an additional half-height PC-compatible 5¼-inch disk drive and two 3½-inch drives, or you can configure the drive options in any combination of floppy and hard drive setups.

With all three of the Amiga computers at COMDEX, the Commodore booth was a sound and light show all by itself. Color video programs, television titling and graphics packages, color digitizers, MIDI (Musical Instrument Digital Interface) packages, computer-aided design software, and desktop publishing programs seemed to be everywhere at the booth.

One of the most remarkable aspects of Commodore's strong COMDEX showing was that it came just over a month after the ouster of chief executive officer Thomas Rattigan, along with a number of high-ranking officers in U.S. operations such as North American general manager Nigel Shepherd. However, under the direction of Commodore International Chairman Irving Gould, the new team headed by general manager Alfred Duncan and new general sales manager Richard McIntyre has moved aggressively to bring Amiga sales in the U.S. up to the levels of success the machine already enjoys in Europe.

Commodore's Compatibles

While the Amigas are clearly the future of Commodore, the company has also jumped into the IBM PC-compatibles market with its PC10-1 and PC10-2 computers. The company cut the prices of both machines, and is bundling Borland's popular *Sidekick* desktop accessory program with each PC.

The PC10-1 comes with 512K RAM (expandable to 640K), a 360K disk drive, five expansion slots, MS-DOS 3.2, and either a monochrome or color monitor. The PC10-2 has 640K of memory and two disk drives.

Commodore cut its prices by a couple hundred dollars, putting the PC10-1 at $799.95 with monochrome monitor, and at $999.95 with color monitor. The PC10-2 with mono monitor costs $899.95; with color monitor, the cost is $1,099.95. The Commodore systems are not sold without monitors.

Although Commodore hopes to gain a percentage of the lucrative MS-DOS market here with the PC10 systems, the company is obviously positioning itself for the long haul with its Amiga family. For that reason, Commodore didn't use any space at COMDEX trying to showcase the PC10 or the 64 and 128. Based on reactions among show attendees to Commodore's Amiga marketing strategy, the new formula seems to be working.

Strategic Simulations (SSI) is also translating established works into software. SSI announced an agreement with TSR to produce software versions of that company's popular Dungeons and Dragons games. The first *Dungeons and Dragons* software is due in the spring of 1988. And SSI is already prepared for the election year: With *President Elect*, SSI has updated this popular simulation to include variables and circumstances specific to the next election.

Maniac Mansion, developed for Activision by Lucasfilm Games, brings new life to the hoary old mad scientist's mansion. When you start playing this game, the scientist has kidnapped your friend, and players must assemble a team of stout-hearted teens to penetrate the mansion and rescue the hapless victim. To its joystick-driven text interface, and detailed graphics of more than 50 rooms with close to 450 objects that players can manipulate, the game adds "cut scenes"—random inserts that are not player-controlled, designed to contribute additional humor to the scenario as well as give *Maniac Mansion* more of the feel of a teenagers-versus-the-mad-scientist movie.

Teenagers were much on the minds of designers at Epyx as well. In a booth that could have passed for a surf shack at Malibu, the com-

pany unveiled *California Games*, the latest addition to its very successful *World Games* series. This time, though, the competitions are not quite as serious as in *World Games*. *California Games* gives players the chance to test their skills at half-pipe skateboarding, BMX stunt bicycle riding, surfing, flying disc toss, roller skating, and footbag bouncing.

Space: The Software Frontier

Epyx also announced the latest in its Masters collection for advanced gamers. With *Omnicron Conspiracy*, Epyx moves to the distant future and the farthest reaches of interstellar space, making the player an extraplanetary detective charged with unravelling the mystery surrounding the disappearance of a starship. The icon and joystick-driven game includes resources such as a world-sized computer and a race of psychics.

Closer to the present is Electronic Arts' *EOS: Earth Orbit Stations*. This simulation, based on NASA's projections for the next half-century in space, charges players with expanding earth's ability to accomplish various profitable tasks in orbit. Those tasks vary widely, but must be done on time and within budget. Successful players can continue to expand their holdings, spreading commerce throughout the solar system, reaping further profits by exploiting the characteristics of the various bodies in orbit around the sun.

One space program that draws on the past rather than the future is Accolade's *Apollo 18: Mission to the Moon*, which permits players to recreate any of NASA's original lunar missions, or to configure missions of their own. A player is both mission-control supervisor and astronaut, requiring mastery of tasks and skills specific to each position.

With *Test Drive*, Accolade moves from spaceways to highways, giving Commodore 64 and 128 users the chance to sit behind the wheels of a Ferrari Testarosa, a Lamborghini Countach, a Lotus Esprit Turbo, and other high-speed, high-performance sports cars. Each car possesses specific characteristics, ranging from acceleration to the effect of lateral G forces, which are recreated in the software.

Play Ball!

Sports enthusiasts were targeted by several software manufacturers offering new baseball, football, basketball, and ice hockey programs.

NBA, from Avalon Hill, is both an animated and a statistical basketball simulation. The game contains outstanding teams and athletes from the past two decades, permitting players to recreate great games from the past, or to arrange confrontations that "might have been." Avalon Hill also announced its *General Manager* disk, an add-on to the company's popular *Super Sunday* football simulation. The new disk expands and enhances the managerial abilities of *Super Sunday* players.

Earl Weaver Baseball (announced for the Amiga at January CES, but now available for the 64) is the inaugural issue in Electronic Arts' new Sports Legends line. Drawing upon the expertise of the former Baltimore Orioles manager, *Earl Weaver Baseball* also provides both arcade-style play, and strategic/statistical play. It is up to the player to pick lineups and assemble teams to face some of baseball's most legendary managers and rosters.

Epyx moves baseball away from the major stadiums and onto vacant lots with *Street Sports Baseball*, the first in a new line of *Street Sports* games. Incorporating sandlot obstacles such as stumps and garbage cans, *Street Sports Baseball* teams are composed of a variety of characters, each with a different level of skill. During play, the game also provides a split-screen view that shows both ground-level and aerial pictures of the action.

Mindscape's *Superstar Ice Hockey* features a variety of real-life aspects—including aging players—in its hockey simulation. Designed for one or two players, *Superstar Ice Hockey* puts players both on the ice as centers and goalies and behind the bench as managers seeking to strengthen a team. The game includes a training camp to which players can be sent to sharpen their skills.

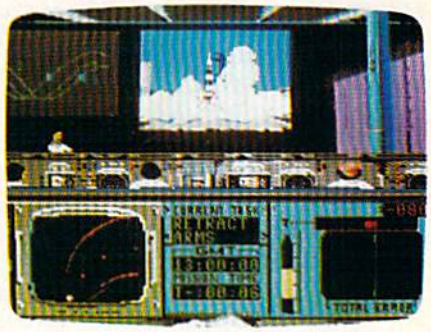
Coming Through For Commodore

Here are details about the Commodore programs mentioned above, as well as information about a number of other Commodore 64 and 128 software packages announced at CES.

Accolade. *Test Drive* and *Apollo 18: Mission to the Moon*, both mentioned above, will be available for the Commodore 64 at $29.95 each.

Sigma 7 is the company's latest addition to its midprice Advantage line. An arcade-style space game, *Sigma 7* is available for the Commodore 64 at a suggested retail price of $14.95.

Accolade, 20813 Stevens Creek Blvd., Cupertino, CA 05014



Apollo 18: Mission to the Moon, *from Accolade, recreates the moon missions of the 1960s.*

Activision. At CES, Activision announced several new programs for the 64, including *Maniac Mansion*, an animated comedy adventure developed with Lucasfilm; *The Last Ninja*, a martial-arts program scheduled for fall release that features more than 130 screens of three-dimensional color graphics and more than 1000 moving objects; and *Top Fuel Eliminator*, a colorful, fast-action drag-racing game.

Activision, 2350 Bayshore Pkwy., Mountain View, CA 94043

Recovering the Scrolls of Wisdom is your quest in The Last Ninja, *a martial-arts action game from Activision for the 64.*

Avalon Hill. Priced at $30 for the Commodore 64, *Darkhorn* provides both strategic and arcade action in a high-fantasy setting as up to four players challenge the Darklord's dominance of the world.

As noted earlier, Avalon Hill's *NBA* is an animated, statistical basketball package that provides players with the chance to recreate 20 historical teams, with rosters including Larry Bird, Wilt Chamberlain, Michael Jordan, and Bob Cousey. The game can be played solitaire, two-person, or in autoplay mode. It is available for the Commodore 64 for $39.95.

The Avalon Hill Game Co., 4517 Hartford Rd., Baltimore, MD 21214

Berkeley Softworks. In addition to *geoPublish*, mentioned earlier, the folks at Berkeley announced *geoProgrammer*, a full-featured application development package for *GEOS* users with a good understanding of 6502 assembly language. Both are scheduled for fall release.

The $69.95 *geoPublish* software permits the creation of customized master pages of graphics and text that can be used on each page of a document and can be loaded from a library or saved for later use. Layout is carried out by defining rectangular regions on each page, which will automatically reformat as the user needs to modify the layout. Text automatically flows around graphics. An onscreen toolbox contains graphics tools, and there are additional type fonts for headlines up to a size of 48 points. All pages can be previewed before printing, and the finished documents can be printed on any *GEOS*-compatible printer. A special *PostScript* driver allows printers like the Apple LaserWriter to produce near-typeset documents.

geoProgrammer, also $69.95, contains three functions: *geoAssembler*, *geoLinker*, and *geoDebugger*. The *geoWrite* word processor is used as the editor for the assembler. Other *GEOS* programs include *geoFile*, *geoCalc*, *Writer's Workshop*, *DeskPack I*, *FontPack I*, and *geoDex*.

Berkeley Softworks, 2150 Shattuck Ave., Berkeley, CA 94704

Brøderbund. Brøderbund is making the bestselling British arcade games *Cauldron* and *Cauldron II* available for the Commodore 64 in one package for $29.95.

The company is also reducing prices on a number of its older packages and pricing them in its new line of Value Priced Software. Arcade games such as *Lode Runner* and *Choplifter!* and productivity software such as *Bank Street Speller* and *Bank Street Mailer* are being offered at prices ranging from $14.95 to $29.95.

Brøderbund Software, 17 Paul Dr., San Rafael, CA 94903

Constellation Software. In addition to a growing line of budget (about $9.95) entertainment software for the Commodore 64, Constellation Software has announced *Quiet Riot: The Silencer*, an earphone system for Commodore computers, including the Amiga. The earphones are being advertised as "Mom's Delight."

Constellation Software, 1300 N. Hagan St., Champaign, IL 61820

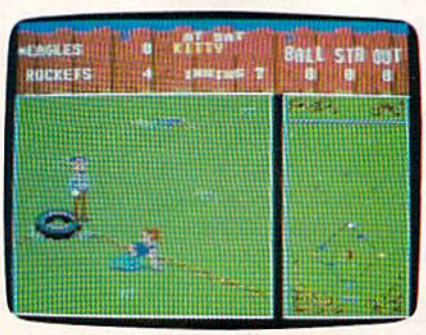
Electronic Arts. Electronic Arts is introducing a number of new products, ranging from entertainment software to personal-productivity packages, with several programs for the Commodore 64.

New entertainment software for the 64 includes the fantasy adventure game *Legacy of the Ancients* ($29.95) and a strategic space simulation, *EOS: Earth Orbit Station* ($34.95).

A new typing tutor program for the 64 has been announced by EA—*Mavis Beacon Teaches Typing*, a graphics-intensive tutor for people of all ages ($39.95).

Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404

Epyx. Building on the success of their *World Games* series, Epyx attracted a lot of CES attention with the introduction of *California Games* (see above). The game will be released for the Commodore 64 in the third quarter of 1987.



Epyx's Street Sports Baseball *puts you on the street in a fast-action baseball game.*

Street Sports Baseball (see above) will be available for the Commodore 64 at a price that's to be announced.

Omnicron Conspiracy, also mentioned earlier, will be available in the fall for Commodore.

Epyx's new midprice line, Maxx-Out, will be launched with three packages, including *Rad Warrior*, *Boulder Dash Construction Kit*, and *Spy Vs. Spy III: Arctic Antics*. *Rad Warrior* challenges players to destroy an alien invader in a radioactive world of the future; *Boulder Dash Construction Kit* permits users to customize their own tunnels, caves, and treasures; and *Spy Vs. Spy: Arctic Antics* pits the familiar spies against each other and a frozen backdrop.

Epyx, 600 Galveston Dr., Redwood City, CA 94063

Firebird. *Knight Orc* puts players in the role of an orc, a mythical bird which, in this scenario, is oppressed by evil humans. The game is illustrated, possesses a 1000-word vocabulary, and is scheduled for release in late summer for Commodore machines, with a suggested retail price of $39.95.

Martial arts is the promise of Firebird's *Golden Path*, in which players take the part of a wise man who must overcome obstacles and challenges while on a mystical quest. Clues to help the player solve the game's central puzzle are delivered in an onscreen window that appears as a book of lore. This will be released for the 64 at a later date.

The Advanced OCP Art Studio is a graphics program that provides users with 16 pens, 16 user-definable brushes, eight random sprays, and three levels of zoom and magnification It also provides a font editor, rotation and enlargement capability, cut and paste, and other graphics/desktop publishing options. The program will be available for $39.95 in Commodore format.

Firebird Licensees, P.O. Box 49, Ramsey, NJ 07446

Gessler Educational Software. With *Battle of Words*, avail-

able in French, German, and Spanish, Gessler offers a five-part arcade-style program aimed at increasing student vocabulary and speed of translation. Priced at $49.95, the program is available for the Commodore 64.

French Micro Scrabble adapts the classic word-building game for competition in French either against the computer's 20,000-word vocabulary or against other players. The game is available for $39.95 for the Commodore 64.

Gessler Educational Software, 900 Broadway, New York, NY 10003

Hi Tech Expressions. Hi Tech has introduced *AwardWare*, a $14.95 design and printing package for the creation of awards, certificates, letterheads, ribbons, tickets, coupons, checks, and other printed items. The program has 20 graphics, 20 graphic borders, unlimited text borders, five seals, and five fonts. A dot-matrix printer is required.

Hi Tech Expressions, 1700 N.W. 65th Ave., Suite 9, Plantation, FL 33313

Infocom. *Stationfall* is a sequel to the popular *Planetfall* comic text adventure, both created by Steve Meretzky (who also collaborated with Douglas Adams for the Infocom hit, *Hitchhiker's Guide to the Galaxy*). *The Lurking Horror*, Infocom's first venture into interactive horror fiction, is a fearful cross between Stephen King and H. P. Lovecraft that was designed by Dave Lebling (coauthor of the *ZORK* series). Both will be available for the Commodore 64.

Infocom, 125 CambridgePark Dr., Cambridge, MA 02140

Inkwell Systems. The makers of the *Flexidraw* high-resolution graphics program (recently enhanced in Version 5.5) for Commodore 64 computers, announced the availability of two new light pens: the model 170-C ($99.95), a new version of the industrial-quality light pen Inkwell has up to now bundled with the *Flexidraw* graphics program; and the model 184-C ($59.95), a new light pen featuring surface-mount technology, two-touch surface switches, and an ergonomic design. Both light pens are designed to be plug-compatible with the Commodore 64, 128, and SX64 computers.

Inkwell Systems, P.O. Box 85152 MB290, 5710 Ruffin Rd., San Diego, CA 92138

MicroProse. *Pirates*, an adventure/simulation game for the Commodore 64 mentioned earlier, is the latest creation by Sid Meier, designer of such software hits as *F-15 Strike Eagle* and *Silent Service*. State-of-the-art graphics and player-selected scenarios are a couple of the features of *Pirates*.

Other new Commodore 64 products include *Project Stealth Fighter* ($39.95), a flight and combat simulator based on the super-secret new Air Force aircraft that evades detection; and *Airborne Ranger* ($34.95), an arcade game in which players take the role of a Ranger behind enemy lines. Both products are scheduled for a late-summer to fall release.

MicroProse Software, 120 Lakefront Dr., Hunt Valley, MD 21030

Mindscape. Among a number of new programs introduced at CES, Mindscape has two games for the Commodore 64: *Into the Eagle's Nest* is a World War II combat arcade game with exceptional graphics ($29.95), and *Bop'n Rumble* ($29.95) is a comic action game in which you save all the grannies from the vicious elements in the city.

Mindscape, 3444 Dundee Rd., Northbrook, IL 60062

Okidata. Okidata announced a universally compatible dot-matrix printer, the Okidata 180, designed for either home or office use, with a suggested retail price of $329. With standard Commodore serial and Centronics parallel interfaces, the Okidata 180 is compatible with all the major personal computers available to home users, without having to add separate interface modules. The printer supports all Commodore and Epson control codes, insuring compatibility with all major software packages for the home. The 180 has print speeds of 180 characters per second (cps) in draft mode, 120 cps in utility mode, and 30 cps in near-letter-quality mode.

The new $329 Okidata 180 printer is compatible with all major personal computer systems, including the Commodore 64 and 128 computers.

Okidata, 532 Fellowship Rd., Mount Laurel, NJ 08054

Paragon Software. Paragon Software's first entertainment package, *Master Ninja: Shadow Warrior of Death*, is a graphics-intensive action game available this fall for the Commodore 64 ($29.95).

The company also has an accounting package for the Commodore 128, *Cash In-Cash Out* ($69.95), and plans to have more computer games available in late 1987 and early 1988.

Paragon Software, Plymouth Center, 521 Plymouth St., Greensburg, PA 15601

QuantumLink. This Commodore 64-specific telecommunications service announced the introduction of four multiplayer casino games that will allow people across the country to play against one another.

The four games, which are packaged on one disk, require the use of a Commodore 64 or 128 computer, modem, telephone, and QuantumLink service. They will be available this fall at $14.95 for the disk, and include blackjack, poker, bingo, and slot machines.

QuantumLink, 8620 Westwood Center Dr., Vienna, VA 22180

SSI. Strategic Simulations announced the release of *President Elect—1988 Edition*, mentioned earlier, a $24.95 strategic simulation game of presidential politics for the Commodore 64. A previous version of this game was released prior to the 1984 presidential race, and the current game lets you make a contest of every bout for the top spot from 1960 through 1988. Owners of the original version can receive the new game for just $10 plus $2 shipping and handling by sending in the old disk.

SSI is also introducing *B-24* for the Commodore 64, a $34.95 flight and combat simulator; *Rebel Charge at Chickamauga* ($49.95), a simula-

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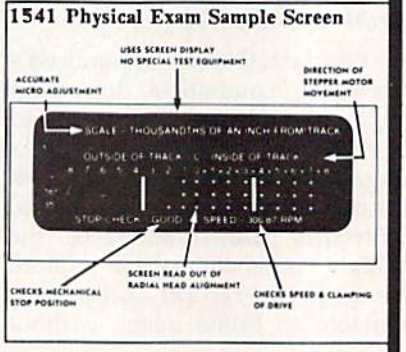
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See Reviews in: Run Special Issue #3, 1/87, p.83; **Info #11,** Aug/Sept 86, p.46 **Midnite Gazette,** April 1986, p. 19.

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tion of one of the South's major offensives during the Civil War; and *The Eternal Dagger* ($39.95), a sequel to SSI's popular *Wizard's Crown* fantasy adventure game.

SSI, 1046 N. Rengstorff Ave., Mountain View, CA 94043

Three-Sixty. This new computer games company, founded by former Accolade head Tom Frisina, has announced that it will offer a variety of new entertainment programs for the major computer systems. A Commodore 64 version of *Dark Castle*, the graphics adventure that has been very popular in Macintosh form from Silicon Beach Software, will be among the first programs available.

Three-Sixty, 2105 South Bascom Ave., Campbell, CA 95008

Thunder Mountain. This budget software line, a division of Mindscape, offers almost 50 different titles of educational and entertainment software at a suggested retail price of $9.95 each. Among the newest Commodore 64 additions to the list are *Top Gun*, an arcade-action game based on the popular movie; and *Rock 'N' Roll Trivia*, a five-volume set of music trivia questions, including on each disk over 1000 questions and answers with six different musical categories and three levels of play.

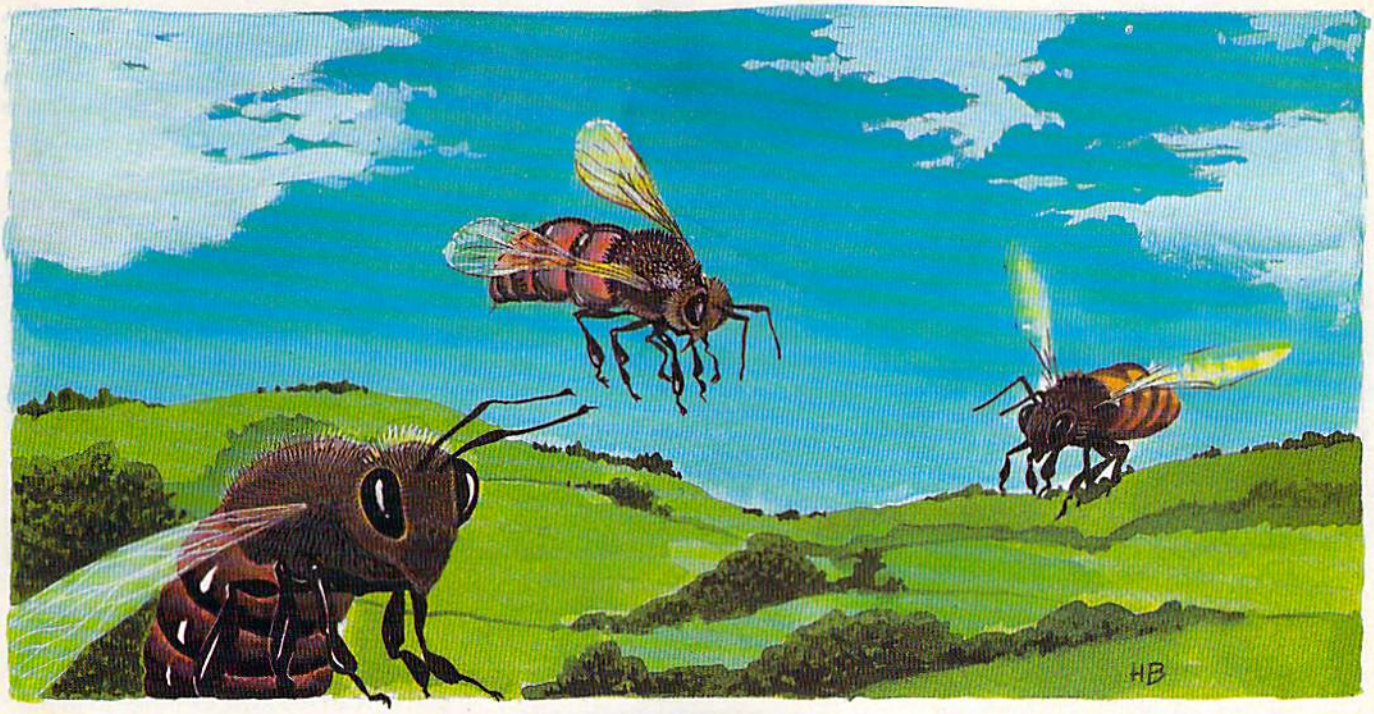
Mindscape, 3444 Dundee Rd., Northbrook, IL 60062

Timeworks. Timeworks has released or announced a number of productivity software packages for a variety of computers, including *The Timeworks Desktop Publisher* for the 64 available later this year. With word processing, page design, drawing tools, and high-resolution graphics, this program offers ease of use and sophistication. Prices have not been announced.

Timeworks, 444 N. Lake Cook Rd., Deerfield, IL 60015

Vision Software. For $8.99 each, Vision Software offers a variety of budget-priced educational programs for Commodore 64 computers. The collection of programs, an educational series that's been used in the Arkansas school system, includes math, English grammar and composition, geography, and many other topics.

Vision Software, 5400 Taylor Rd., Suite 108, Naples, FL 33942



Bee Zone

Kevin Black and Michael Wiens

Collect the honey of giant bees in this fast-action arcade-style game for the 64. It's never been this much fun to be caught in a hive. One joystick is required.

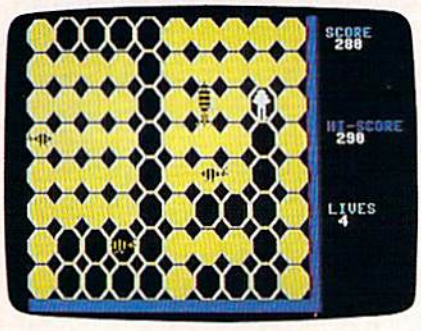
It is common knowledge that the Giant Honeybee, found only in "Bee Zone," is the most productive of all honey-producing bees. A single Giant can out-produce a whole hive of common honeybees. Because of the size of the bees (the largest are six feet long), collecting their honey is a lucrative, yet dangerous business.

This summer, you've decided to make a little pocket money collecting honey. Good luck—it's one of the hardest jobs in the world.

Typing It In

"Bee Zone" is written entirely in machine language. Enter it with "MLX," the machine language entry program located elsewhere in this issue. When you run MLX, you'll be asked for a starting and ending address. For Bee Zone, respond with the following values:

Starting address: 0801
Ending address: 1DF8



Collecting honey from a hostile hive in "Bee Zone."

When you've finished typing in the data, be sure to save it to tape or to disk before leaving MLX.

Bee Zone can be loaded, saved, and run like a BASIC program. When you start the program, Bee Zone's theme music plays as you watch the animated title screen.

Press the RUN/STOP key to start the game. You're a beekeeper wearing a protective white smock (which is adequate for protection from average honeybees but insufficient protection from Giants). To get to the next layer of honey, you must visit all 80 honey cells on the screen. The worker bees are constantly inspecting every inch of the hive. Stay far away from them—they'll sting you on sight. Also beware of the huge queen bee. She leaves a trail of honey everywhere she goes.

When you've finished gathering all the honey in this layer of the comb, you move on to the next.

Each cell of honey earns you 10 dollars. Occasionally, an egg appears in the center of the screen. Capture it to earn 50 dollars and a bonus life. If you die before reaching it, the egg disappears.

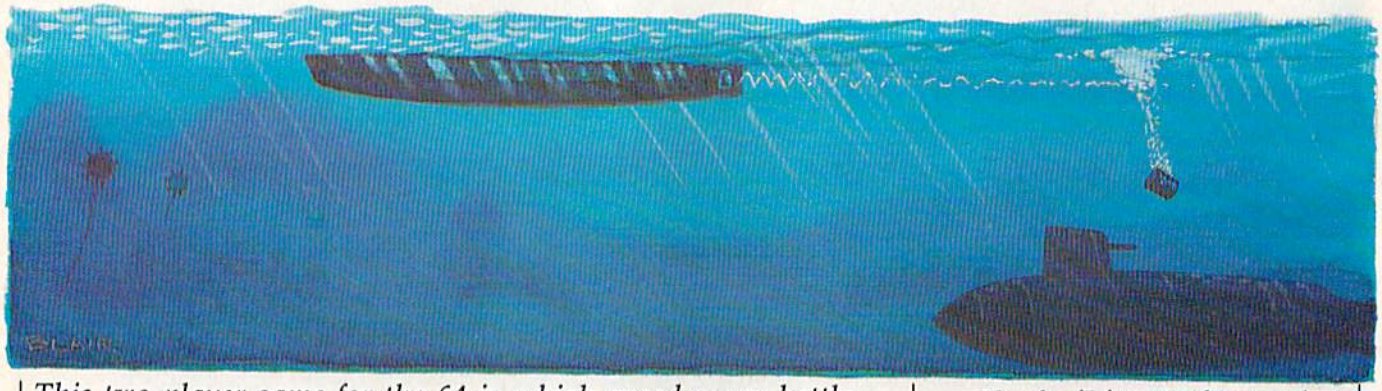
Your high score is displayed on the screen at all times, along with the current score and the number of lives remaining.

To start a new game at any time, press RUN/STOP. To pause the game, hold down the SHIFT key or press SHIFT LOCK.

See program listing on page 80.

Sub Attack

Tai Bush



This two-player game for the 64 is a high-speed ocean battle complete with dueling submarines, floating mines, torpedoes, and a patrolling enemy destroyer. Two joysticks are required.

It's turning out to be a very, very bad day.

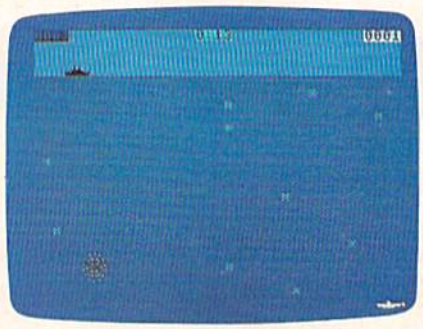
You're the commander of a brand new submarine. Your opponent commands an enemy sub. You had hoped to avoid the war by hiding in a minefield set up by yet another nation until the peace talks ended. Unfortunately, your opponent had the same idea. And, as if you didn't have enough trouble, the side that laid the minefield has noticed the commotion and is now sending destroyers to drop depth charges on whatever was causing the racket. As a result of these unhappy circumstances, you're spending the day launching torpedoes and dodging mines, enemy torpedoes, and depth charges.

"Sub Attack" is a two-player arcade-style game that demands coordination, quick-thinking, and practice. Three levels of speed and selectable game time make it many games in one.

Typing It In

Sub Attack is written entirely in machine language for maximum speed and playability. Type it in with the "MLX" machine language entry program found elsewhere in this issue. When MLX prompts you for the starting and ending addresses of the data, respond with the following values:

Starting address: C000
Ending address: CC0F



The white submarine has just destroyed his opponent. Meanwhile, an enemy destroyer cruises the sea above, waiting to drop depth charges on either you or your opponent. The mines pose yet another threat to either sub.

When you've finished typing in all the data, be sure to save a copy to tape or disk before leaving MLX.

When you're ready to play, plug in two joysticks and load the program with a statement of the form:

LOAD"SUB ATTACK",8,1 (tape users substitute **,1,1**)

Substitute the name you used to save the machine language file. Type SYS 49152 to start the game.

The Attack

Sub Attack first displays a title screen. From this screen, you can use the f3 function key to select the speed of the game. Choose either fast, medium, or slow. It's best to try the slowest speed for your first game.

Use the f5 function key to select the length of the game. You can choose lengths of 1, 3, or 5 minutes. Press f1 to begin the game. The player with the joystick plugged into port 1 controls the sub on the right (the white one); port 2 controls the sub on the left (the black one).

You can move and shoot in any direction—including diagonally. Launch torpedoes by pressing the fire button. As you move, be sure to steer clear of the mines that clog this part of the ocean.

Every so often, a destroyer will move across the top of the ocean, dropping depth charges as it goes. These charges (and the explosions that they generate when they hit a mine) are deadly.

When a player is hit, the game pauses and both players are placed back into their starting positions.

Scoring

You score 5 points every time you hit your opponent. Shooting a destroyer will give you 3 points. If your sub is sunk by a depth charge from the destroyer, your opponent is given 3 points. If you run into a mine, your opponent will get 1 point.

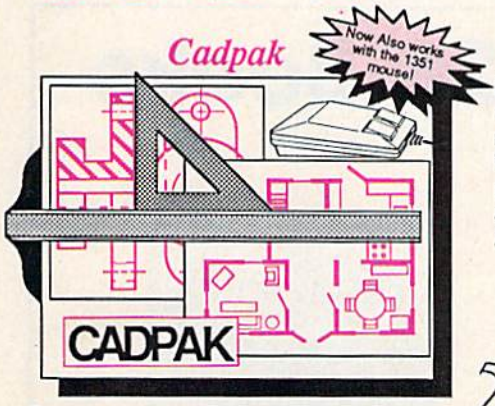
The game ends when the timer reaches the time limit you selected. The title screen reappears with your scores on the screen.

Pressing RUN/STOP-RESTORE at any time will break out of the game. However, since the game alters critical BASIC pointers, it's best to reboot the computer when you've finished playing.

See program listing on page 89.

HOT SELLERS

Cadpak



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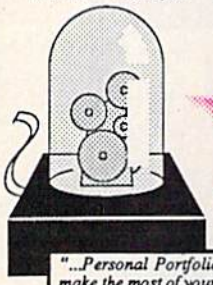

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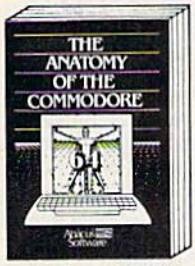

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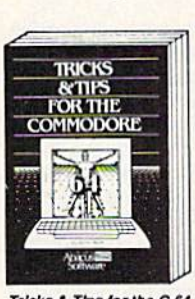

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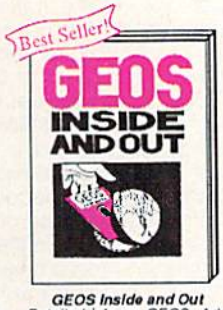

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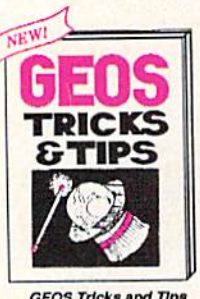

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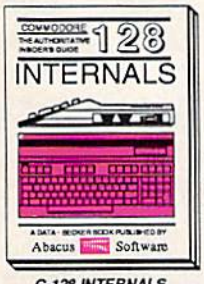

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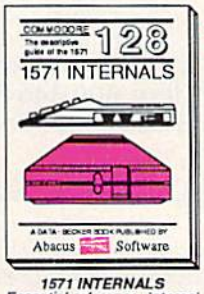

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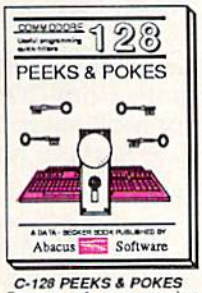

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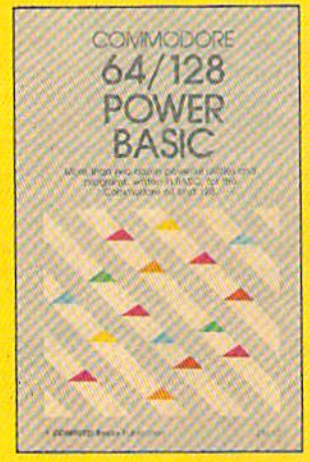

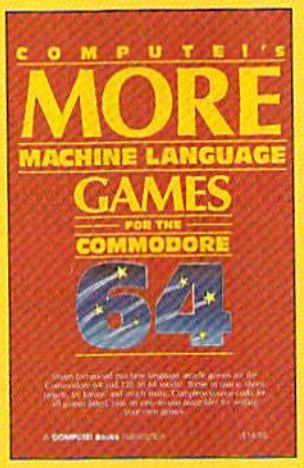

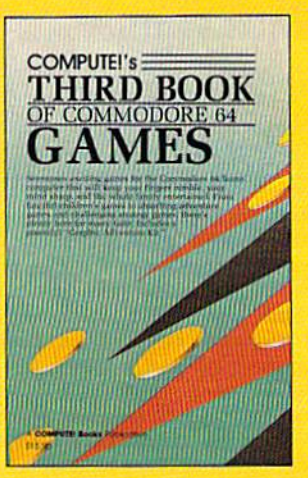

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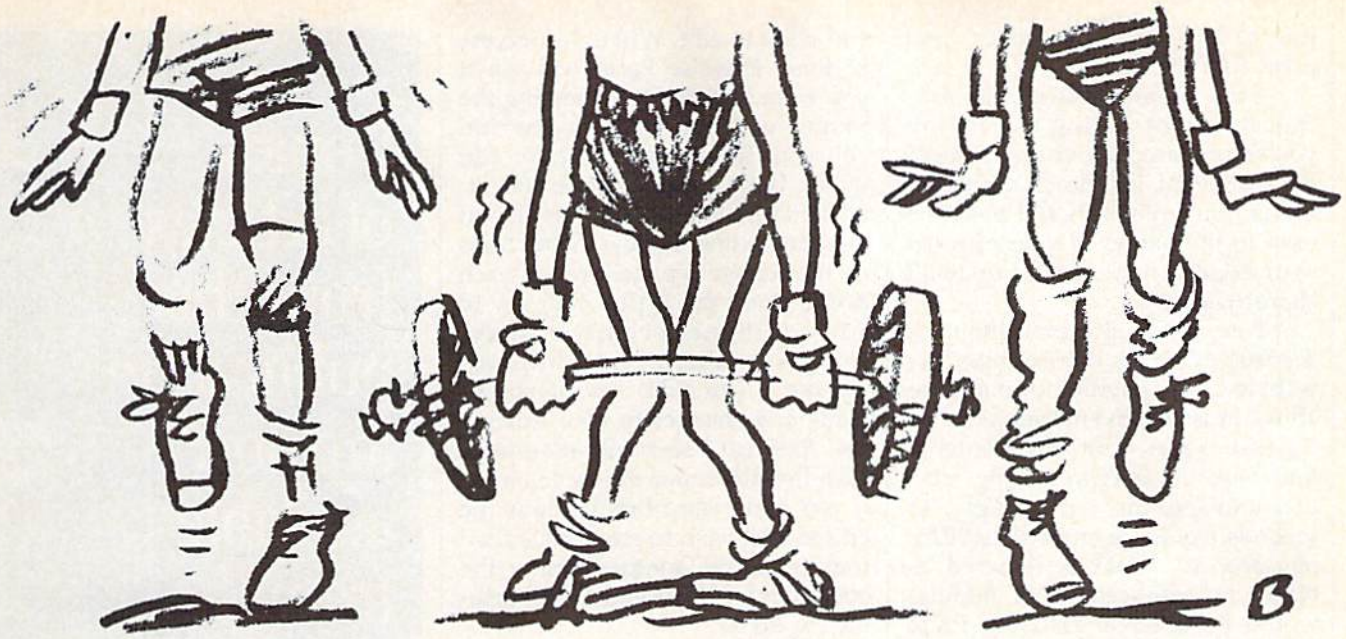

Exercise Pacer

Jon H. Tonaki

This easy-to-use exercise timer turns your 64 into a coach, urging you on to better health and fitness. You can store several exercise routines on disk, providing a variety of routines for everyone in the family.

"Exercise Pacer" is a handy program whether you're working off a little extra weight or maintaining your fighting trim. By following the simple menus and entering information requested by the prompts, you can design your own exercise routines that include many activities and various durations. When you have spent enough time on one activity, your 64 will tell you to move on to the next event. There is a constantly updated clock on the screen so you won't lose track of time, and a progress check that lets you know how many activities are left before the end of the routine.

Typing It In

Type in Exercise Pacer and be sure to save a copy before you run it. Exercise Pacer has a few machine language subroutines stored in DATA statements, so be sure to use the "Automatic Proofreader," found elsewhere in this issue, when typing it in.

When run, Exercise Pacer will pause for a few seconds to do some preparation. Then you will be asked to enter the time of day. Enter the time as a four-digit value without a colon. For example, for 1:30 you would enter 0130, and 12:45 would be entered as 1245. Press RETURN after typing the time value.

When you've pressed RETURN, Exercise Pacer will print out the time (12:45) and ask if it is correct. If not, respond by pressing the *N* key so you can go back to reenter the digits correctly.

Next, the main menu will appear. The four function keys appear on the screen, each with a specific purpose.

Key	Function
f1	Enter exercises and save to disk when finished.
f3	Recall exercises from disk and edit or run the exercises.
f5	Format disk.
f7	Exit Exercise Pacer.

How To Prepare Your Exercise Plan

Before using the program, you should do some planning. Remember to consult your physician before beginning any exercise program. When you have worked out what exercises to include, list each of them on paper. Give each an *event number*, *exercise name*, and *time limit*. Remember to include time for breaks and rests between repetitions. If you work out with weights, allow time to adjust the weights for the next exercise. A sample listing is shown below:

Event	Exercise Name	Time Limit
1	Parallel bar support L	15 seconds
2	Rest	10 seconds
3	10 push-ups	10 seconds
4	Rest	10 seconds
5	Prepare weight station for chin-ups	1 minute

Entering Routines

Before you start, you will need a blank disk to store the information you enter for Exercise Pacer. Format the disk by pressing *f5* to select formatting from the main menu. Exercise Pacer will guide you through each step of the formatting process. One disk will hold several exercise routines, so this step will only be necessary the first time you run Exercise Pacer.

You should now be ready to enter your routines into Exercise Pacer. Press *f1* on the main menu to enter your exercise routine. Exercise Pacer will ask for a filename for the routine. Type in the filename

(not to exceed 12 characters) and press RETURN.

Start programming your routine by event. Using the listing you've prepared, enter the name of the first event. (Commas, quotation marks, and colons should never be used in the names of your events.) Your exercise name can be up to 35 characters long.

Next, enter the time limit for the first event. In our example, we want to hold a parallel support L for 15 seconds. When entering time for Exercise Pacer, you must enter a four-digit value representing minutes and seconds. For example, 15 seconds would be entered as 0015, 59 seconds would be entered as 0059, and 60 seconds (1 minute) would be entered as 0100. Press RETURN after typing the time value.

Never enter colons between the minutes and seconds (00:15) and always convert to minutes after 59 seconds (0060 is illegal and will not be accepted).

After you have pressed RETURN, Exercise Pacer asks if you've made a mistake. Check over your entry carefully. If your entry is correct, pressing *N* will move you on to the next event. If you made a mistake, you can correct it by pressing *Y*. You will be prompted again for the name of the event. If the name is correct, just press RETURN. Otherwise, type the name in correctly. Then you will be prompted for a time. Once again, if the time is correct, just press RETURN.

Keep entering data from your exercise sheet until you run out of events. Exercise Pacer will allow you to store a maximum of 200 events per routine. You can exit from the programming mode by entering *END* as the name of the exercise. Exercise Pacer will now ask you to place your formatted data disk in the drive and to save your exercise routine under the name you assigned.

If the save is successful, the computer gives you the opportunity to repeat the save (in the event you want to make a back-up on another disk).

Editing Exercise Routines

To make changes to an exercise routine, just press *f3* from the main menu and enter the name of the file you want to edit. When disk access is done, Exercise Pacer will ask if you want to go right to running the routine or if you wish to view and edit your file. Press *E* to enter edit mode. With the edit mode activated, you can view any exercise event in your routine. Follow instructions on the screen to page through each event. Press the *A* (for *Add*) key to add additional events, or make changes to existing events by pressing the *E* (for *Edit*) key. If you've made any changes to your existing file, Exercise Pacer will attempt to save the file under the same name. If you don't want the previous file erased and wish to store the edited routine under another name, the computer will give you an opportunity to do so.

Working Out

Recalling and running a routine is easy. Just press *f3* and enter the name of the file you wish to run. When Exercise Pacer asks you whether you want to run or edit, press *R* (for *Run*) to begin the routine. When Exercise Pacer is activated, a bell will ring to alert you that the routine will start soon. Then Exercise Pacer's screen appears. On it, the computer tells you the time of day, the number and name of the event you should be working on, how many events are left in your routine, and the time limit preset by you for that particular event. The last item on the screen is the clock which counts off the time.

When the time limit is reached, Exercise Pacer chimes five times and moves on to the next event. You may pause the timer by pressing the space bar. Pressing it again restarts the timer. To skip to the next event, press the up-arrow key once for each event you wish to advance.

When you've finished with all the exercises, Exercise Pacer once again rings the bell and then returns you to the main menu.

To abort Exercise Pacer when the timer is running, keep pressing the left-arrow key until the main menu appears.

See program listing on page 78.

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Screen Maker

Clay R. Reed

Programmers and artists can streamline the creation of custom screens with this fast and efficient character-graphics program. Packed with features and simple to operate, "Screen Maker" will change your thinking about character graphics. The program offers joystick operation, a full palette of colors and characters, and a subroutine to make your custom screens easily accessible for BASIC programming.

Anyone who has experimented with Commodore 64 character graphics has probably come away with two strong convictions: You can draw just about anything using character graphics, but it takes patience and lots of time.

"Screen Maker" is a utility for artists and programmers alike which puts ease and joy into using character graphics. It allows you to draw, erase, scroll the screen in three directions, change colors, and replace characters faster than the blink of an eye. It also allows you to save and load graphics either from within Screen Maker itself or from your BASIC program. Plus, it provides you with a palette of characters and colors to choose from, and it lets you use a joystick. Although it is written entirely in machine language, use of Screen Maker requires no knowledge of machine language programming.

Features

Screen Maker provides these features:

- Selection of any of the uppercase/graphics characters, standard or reverse, from the onscreen palette.
- Placement of any character anywhere on the drawing screen using the joystick.
- Choice of any background, border, or character color.
- Variance of cursor speed.
- Scrolling of the screen horizontally or modifying the program to scroll vertically.
- Changing of characters or colors on the drawing screen to any other character or color.
- Saving of your creation to tape or disk for later recall.
- Printing of your Screen Maker graphic designs.

Typing It In

To type in Screen Maker, you must use the "MLX" machine language entry program found elsewhere in this issue. When you run MLX, it will ask for a starting and an ending address. Respond with these values:

Starting address: C000
Ending address: CB0F

Be sure to save a copy of Screen Maker to disk or tape before exiting MLX.

How To Use Screen Maker

Disk users must load this program by typing in LOAD *"filename"*,8,1, where *filename* is the name you used to save Screen Maker from MLX. Tape users should type LOAD *"filename"*,1,1.

To run the program, type SYS 49152 and then press RETURN. You will see a drawing area and a palette. Although you see only the top 17 rows, the drawing area is actually a full 25 rows high. The other eight rows are hidden behind the palette at the bottom of the screen. You can scroll the drawing area so that the bottom eight rows become visible. You can also make the palette disappear in order to see the entire drawing at once.

To the left of the palette is an area which provides access to several special features. Between the special features and the character palette is the color palette.

Using a joystick plugged into port 1, move the flashing cursor to one of the characters in the character palette and press the fire button. The cursor will take the shape of that character. Then move to the color palette and choose a color, again pressing the fire button. Move the cursor up to the drawing area. When you press the fire button, you will transfer the character to the screen in the selected color.

As mentioned earlier, only 17 drawing rows are displayed at a time. To get to the bottom rows, hold the joystick in the down position while the cursor is at the bottom border. This will scroll the screen up one row at a time. Holding the joystick in the up position while the cursor is against the top border will scroll the screen back down one row at a time until it reaches its original position with rows 1–17 displayed. Remember that the drawing will be saved or printed in its current position. If it is not positioned the way you want it to look on the printout, adjust it with the various scrolling features of Screen Maker.

Using Special Features

+ and − Control the cursor speed. Pressing the fire button while the cursor is over the + increases the cursor speed. Pressing the fire button while over the − decreases cursor speed.

BORBGR Selects border and background colors. Pressing the fire button while the cursor is over the first three letters *(BOR)* will change the border color. The last three characters *(BGR)* change the background color.

SCROLL Scrolls the screen to the left one column. Characters which scroll off the screen on the left reappear in the last column on the right. This is useful in adjusting the screen's horizontal position.

DO This is the character swap command. Using the joystick, place the character to be changed in the first space (at far left) and then place the new character in the second space. Move to the word *DO* and press the fire button. Every character on the drawing screen which matches the character in the first space will be changed into the character in the second space. The third and fourth spaces operate similarly. If you wish to change every diamond on the screen into a heart, and vice versa, you put a diamond into the first and fourth spaces and a heart into the second and third spaces; then execute *DO*. This will swap the two characters.

••••DO This is the color swap command. It functions identically to the character swap command except that you place colors, rather than characters, into the circles in order to change or swap character colors.

SV LD These are the save *(SV)* and load *(LD)* functions. Position the cursor over *SV* and press the fire button. Screen Maker will prompt you for a filename, and then save the current screen to tape or disk under the name specified. It will then save the colors of the screen. The color file has the same name as the screen file, except the first character of the color filename will be an up arrow. Say you saved the screen under the name SCREEN. The color file will be written to the disk under the name ↑CREEN. The *LD* option will load a screen and its associated color file, including the background and border colors, from tape or disk.

PRINTS Prints the current screen on the printer (your printer must support the Commodore character set).

CLRHME When the cursor is over *CLR* and the fire button is pressed, the screen is cleared. *HME* turns off the palette to display the full drawing as long as the fire button is pressed.

Modifying The Program

If you want the screen to scroll continuously up or down as long as the joystick is held in the up or down position, follow this simple procedure:

Load a working version of Screen Maker; then type NEW and press RETURN. Type the following three lines in direct mode, pressing RETURN after each line.

```
FOR L=49369 TO 49373: POKE L,234:
  NEXT
FOR L=49406 TO 49412: POKE L,234:
  NEXT
POKE 43,0: POKE 44,192: POKE 45,16:
  POKE 46,203
```

Now save a copy of the modified version using the same format you would use to save a BASIC program: SAVE"MOD VERSION",8. After making the modification, you must reset the computer by turning it off and back on.

Another useful feature is to be able to access the screens you create from your own BASIC programs. The following short program will allow you to do just that. Remember to save a copy of it to tape or disk before running it.

```
BE 10 REM COPYRIGHT 1987 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
DE 20 PRINT"{CLR}{3 SPACES}COP
      YRIGHT 1987 COMPUTE! PUB
      ., INC."
RD 30 PRINTTAB(10)"ALL RIGHTS
      {SPACE}RESERVED"
AH 40 FORL=679TO747:READA:POKE
      L,A:X=X+A:NEXT:IFX<>1070
      2THENPRINT"DATA ERROR":S
      TOP
BH 50 DATA162,238,160,2,173,23
      7,2,32,189
MJ 60 DATA255,169,1,162,8,168,
      32,186,255
RA 70 DATA169,0,32,213,255,173
      ,238,2,201
SH 80 DATA94,240,8,169,94,141,
      238,2,76,167
AC 90 DATA2,162,4,160,0,169,21
      6,133,254
PB 100 DATA169,204,133,252,132
       ,253,132,251
FF 110 DATA177,251,145,253,136
       ,208,249,230,252,230,25
       4,202,208,242,96
```

To access your screens, run the short program above. Then load your BASIC program and add the following subroutine.

```
SJ 10 FF$="FILENAME":GOSUB6000
      0:END
FD 20 REM
FD 30 REM YOUR PROGRAM CONTINU
      ES
DE 40 REM
GP 60000 POKE53265,PEEK(53265)
         AND239
HF 60001 FORXX=1TOLEN(FF$):POK
         E749+XX,ASC(MID$(FF$,
         XX,1)):NEXT
EJ 60002 POKE749,LEN(FF$):SYS6
         79
DF 60003 POKE53280,PEEK(2024):
         POKE53281,PEEK(2025)
BA 60004 POKE53265,PEEK(53265)
         OR16:RETURN
```

You can now load your screens by including a line similar to this in your BASIC program:

```
10 FF$="filename":GOSUB 6000
```

In this example, *filename* is the name of the screen to be loaded. Each time your program defines FF$ and executes GOSUB 6000, the Screen Maker screen will be loaded.

See program listing on page 87.

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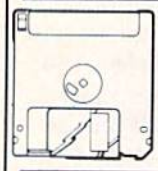

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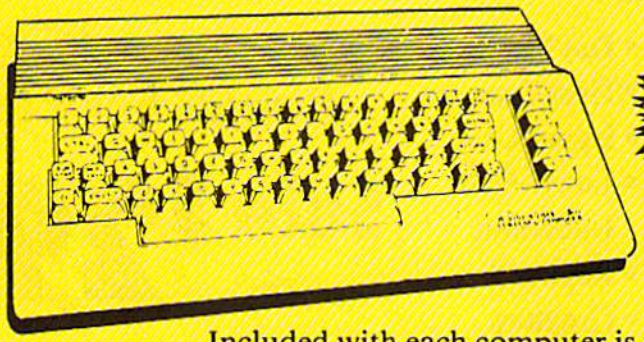

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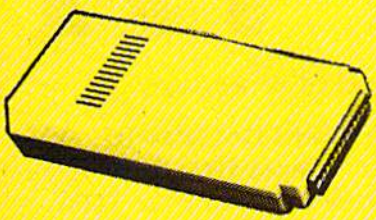

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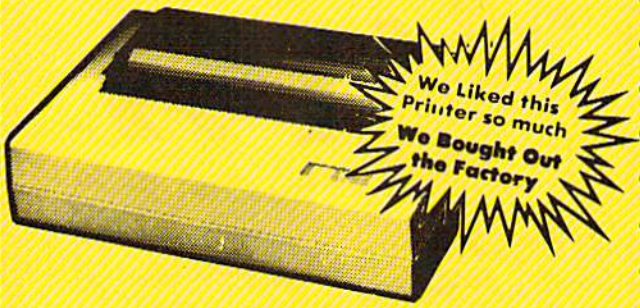

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AlgeBlaster!

For years teachers have assigned exercises to students, first with chalk and slate, then with pencil and paper, and later in bound notebooks. With the growing availability of classroom and home computers, the next logical medium for these exercises is the educational software package.

In keeping with the industry standards they've helped to establish, Davidson & Associates has released *AlgeBlaster*, a program designed to help the student tackle the basic steps in solving algebraic problems. This program provides instruction for 21 different topics from five subject areas: Positive/Negative Numbers, Monomials and Polynomials, Factoring, Equations, and Systems of Equations.

Each topic is covered by way of three separate activities. In "Study the Steps," two sample problems are displayed, one at a time. The student moves an arrow through the problem, and an explanation for each step in its solution appears below it. "Build Your Skills" is a ten-problem practice session with prompts available to help the student think his way through each exercise. "Solve It!" is the real test: 20 problems with no prompts; students are, however, allowed two attempts at solving each problem.

AlgeBlaster! provides clear instruction and good, challenging drills—a combination almost always guaranteed to increase skills. The program employs a building technique that establishes a foundation on which subsequent lessons can be constructed. Topic exercises rely on skills learned in previous material. Problems in the exercises start out easy and grow in difficulty. The prompts in "Build Your Skills" are carefully written to help students work out the solution without giving away the answer.

AlgeBlaster! is a forgiving teacher. Problems marked as incorrect in the "Solve It" section may be retried by students who wish to improve their scores. For those who like to keep track of performance, or for parents or teachers who wish to check a student's progress, *Algeblaster!* gives users the option of printing out a record with date, topic, percentage of problems correct, and a list of the problems missed.

AlgeBlaster! makes it easy to tackle the 20 "Solve It!" problems, interrupting the work for a congratulatory screen at the 10-problem point, and with another at 15 problems. To allow for further study, all the problems and solutions are given in the manual. (This proved to be an unexpected help—one problem had an incorrect answer on disk, but the correct one was in the manual.)

AlgeBlaster! allows you to create problem lists for use in "Solve It!" This is aimed at providing greater latitude in study, *but* there are some problems. The manual tells you it's all right to use spaces in the filename. It isn't. Also, if you don't select the right options, you can end up in a loop that leaves you with a screen ordering you to check your data disk and press RETURN (which accomplishes nothing). The editor is difficult to use because it is so particular; this can be frustrating.

AlgeBlaster! *provides clear instruction and good, challenging drills—a combination almost always guaranteed to increase skills.*

As good as the rest of *AlgeBlaster!* is, it, too, has some limitations. Although there are no bugs, there are a few things you should be aware of before getting started.

First, in the "Solve It!" exercises, alert students will be able to detect patterns in the solutions. This could be seen as good or bad. For some, finding patterns will actually help in learning how to figure the solution to certain categories of problems. For others, though, it may provide a lazy way out: The pattern, rather than algebraic procedures, can be used as the basis for arriving at solutions. This characteristic could be construed as too helpful, leading rather than teaching the student. Again, this is not necessarily bad, but students, parents, and teachers should be aware that this is how the program operates.

Second, while not all algebra problems lead to a single answer, this program's problems do. Where algebra allows some answers to be represented as +/−, the program requires the student to solve for a single, acceptable answer. The final limitation we discovered in *AlgeBlaster!* concerns the "congratulations" screens in the program: As graphics go, these are very unsophisticated. This can be viewed as a drawback because teenagers (those most likely to be using this package), familiar with videogame graphics, may be unimpressed by the simplicity of those used here. On the other hand, while that may be partly true, the purpose of this program is not entertainment, so users probably won't be looking for much graphic excitement. We both agree that the graphics sequence is merely a pat on the back, a little encouragement. There was a time when solving a problem and getting a good grade was all the reward a student expected, so the importance of this feature will be decided by each user.

AlgeBlaster! is a software workbook. It doesn't try to entertain but puts you to work on improving your skills, encouraging you and recognizing work well done. The problems have been compiled with care, and the explanations have been made as brief, comprehensive, and understandable as possible. The effort expended to create this tutorial is laudable, because it works. It's an effective review of algebra. We're about 20 years beyond our algebra classes, but sessions with *AlgeBlaster!* brought everything right back. For a student in the midst of covering the material, *AlgeBlaster!* would be an even bigger plus.

—David and Robin Minnick

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Where In The USA Is Carmen Sandiego?

In *Where in the USA is Carmen Sandiego?*, you play a sleuth in the Acme Detective Agency. Your mission is to track down Carmen Sandiego, who has escaped from a European prison and is now in the United States, assembling a gang of toughs to help in her criminal endeavors. To find her, you must travel the U.S. and seek out her contacts, picking up clues along the way.

You do have some help: Your agency managed to steal Carmen's scrapbook, which gives you information on many of her thugs; the Crime Computer helps you narrow down the suspects; and you have a copy of *Fodor's USA*, a travel guidebook, for reference (included in the package, and the reason the box is so thick). Aside from these, you must rely on your detective skills.

This package is so intriguing that players will be drawn to it again and again, learning a little more about logic, common sense, and U.S. geography each time.

This game is both educational and challenging, and it clearly teaches a lot about U.S. geography. As you travel through the U.S., clues direct you to various cities and points of interest. Some clues are fairly easy to figure out (such as knowing that to get to Cape Canaveral you should take a plane to Miami, not a plane to Houston), but others are more involved, and you'll probably have to read through parts of *Fodor's USA* to figure out where to go. The location clues work hand-in-hand with clues gathered from Carmen's scrapbook, so note-taking is essential, and, since you are only given a limited amount of time to find Carmen, every detail is important.

The main screen is divided into four parts: The top left corner shows your current location, time, and day (for example, Atlantic City, 7 p.m., Tuesday); the majority of the left screen shows a scene in your current city; the top right corner gives textual information, usually about your location; and the bottom right screen displays your choices of action. From the city screen, you can choose See Connections, which shows what places you can reach directly from your city; Depart By Plane, which allows you to go to another city; Investigate; or the Crime Computer.

Montgomery
Wed
5 P M
Welcome to Alabama, the Camellia State.
The economy of Alabama once depended almost entirely on cotton, but now cotton accounts for only five percent of the state's farm income.
Phoenix
Topeka
Santa Fe
Anchorage
Portland

When you Investigate, three buildings within the city are shown. You may enter any or all of them; certain ones will yield clues about the suspect. Visiting each building takes up time (remember, your time is limited), but as you become familiar with the suspects and their haunts, and as you pick up more clues, you'll begin to narrow down which places to investigate and which to leave alone.

The Crime Computer lets you enter details about the suspect. You can specify the suspect's sex, hair color, favorite food, favorite sport, hobbies, and musical preferences; then let the computer do its work. While the computer may tell you that you're ready to make an arrest, it may just as easily yield nothing at all. However, several hours elapse from the time you start the Crime Computer to the time it gives you information, so you may find that you don't want to use it often.

If you solve the puzzle and arrest Carmen, you can start the game over again, but in the new game everything will be different. In this respect, *Where in the USA* is unlike most adventure games, which are discardable once solved. In fact, this package is so intriguing that players will be drawn to it again and again, learning a little more about logic, common sense, and U.S. geography each time. The interface (all joystick driven) is friendly, and the game is well designed. Its only drawbacks are that you can save only one mission per disk, and once you save that mission, you have to reload the game to continue. But these flaws are forgivable. *Where in the USA is Carmen Sandiego?* is one of a new breed of educational products—a game that makes learning both challenging and enjoyable. That's a combination hard to beat.

—Neil Randall

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SpeedTerm 128

From time to time, we read or hear complaints that there is little software available for the Commodore 128. And then along comes another program from a company like Abacus—in this case *SpeedTerm 128*. Here we can point out that greater selection is less important than high quality.

Abacus has again focused its development and marketing on an area left vacant by most software publishers, and in doing so it has brought forth a 128-specific telecommunications program that is not only good, but also easy to use.

In making full use of the features of the 128, *SpeedTerm* may reassure you of your choice in computers. The disk is self-booting from a 1571 disk drive and will allow use of a two-drive system (drive 1 being designated by an *8>* prompt, and drive 2, by *9>*). Further, it takes advantage of the extended memory by keeping a full "help screen" in an area that acts very much like a RAM disk, being always available at the touch of the Help key.

Abacus has again focused its development and marketing on an area left vacant by most software publishers, and in doing so it has brought forth a 128-specific telecommunications program that is not only good, but also easy to use.

When in the Command mode, the Help Screen displays every available command, including one that will swap to a 40-column display for those who may not have an 80-column monitor. There is also a DOS wedge, invoked simply by typing *DOS*, that will allow you to perform disk housekeeping functions without leaving the program. You'll find this important when you're online, ready to download a file, and suddenly find you have no formatted disk.

The command structure of *SpeedTerm* is such that, although you have the Help Screen only a keypress away, you may soon learn to communicate without it. Efforts have been made to make the commands mnemonic, so that RP means Receive Punter and TP means Transmit Punter; DIR calls up the disk directory and BUF tells you the status of the buffer.

And although the list of available commands may at first seem daunting, you should bear in mind that they will not all be used at each session. Getting online and uploading or downloading a file or a game—or carrying on a CB-like conversation with a new friend—usually involves no more than half a dozen commands.

Since time is what we buy from communications services, such as CompuServe and Delphi, it makes sense for most of us to buy as little as possible. Long files can be downloaded to a memory buffer much faster than to your printer or disk drive, and from the buffer they can—once you're off-line and no longer paying for time—be saved to disk or printed to hard copy. For this reason, a capture buffer is good, and large ones are better than small ones. *SpeedTerm* provides a capture buffer of 46K, and if you're ready for a comparison, we'll point out that this is greater than the total free memory on a 64.

In its terminal mode, *SpeedTerm 128* emulates the DEC VT-52 terminal. You don't have to worry about this beyond accepting that it is a standard for telecommunications. Nor will you have to worry a great deal about parity, word length, stop bits, or duplex, for *SpeedTerm* uses the most popular combination as a default mode: no parity, 8-bit word, one stop-bit and full duplex. These settings can, of course, be changed as necessary.

So, as far as modems are concerned, select yours from the menu listed at the beginning of the program and then forget about it. With the exception of the Commodore 1670 (1200 baud), all modems listed are 300 baud.

Where communication protocols are concerned, *SpeedTerm 128* supports both Xmodem and Punter, Xmodem being an almost universal standard and the Punter being designed specifically for Commodore computers. Both accomplish the same thing: error-free transfer of files. Also making file transfer easier is the ability of *SpeedTerm* to convert Commodore ASCII to true ASCII—rather like converting a regional dialect to one universally understood.

The documentation supplied with *SpeedTerm* exhibits the attention to detail we've come to expect from Abacus. Though it comprises only 70 pages (including index), it is supplied in a loose-leaf binder that will lie open on your desk, thus making reference quick and easy. While it is written in such a way as to be informative and helpful to the beginner, older hands are told what sections they may skip to get to the heart of the program. Thus, the manual should offer something to everybody.

If you're a newcomer to telecommunications, there are several things you should understand about terminal programs. First, they are generally inexpensive. Next, being apparently easy to write, there are any number of public domain programs available. A third characteristic of terminal programs is that they fail to dazzle: Don't look for your screen to explode with computer pyrotechnics in the form of mindwarping graphics and sound.

Like *SpeedTerm 128*, such programs do more than fill your screen with soundless text, making it look like . . . well . . . a terminal (the value of *SpeedTerm* being that it does this by utilizing the features of the 128). And that soundless text will do no more than provide you with a link to the world—which is, after all, rather dazzling.

—Ervin Bobo

Abacus Software
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The Writing Adventure

Consider this. You are a parent or teacher. You want your child or a student to learn how to write compositions. You know he has imagination. You hear it when he tells you why he's late coming home from school. He watches a lot of TV. He's fascinated by your computer, which he uses constantly for video games. How can you get him away from the TV and into capturing some of that imagination on paper? Introduce him to *The Writing Adventure.*

The Writing Adventure takes the writer through a series of pictures. Each colorful graphic depicts a scene which the adventurer—the writer—must describe. The scene may contain items which can be looked at, picked up, or dropped, text-adventure fashion. Similarly, the adventurer must choose an exit from the scene, and his or her ability to take that path may depend upon what items are being carried.

The writer's description of the scene is taken down on notecards that appear onscreen at the touch of a key. These are titled to match the scene and must be filled with a preset number of words (which is adjustable) before the writer can move on to another scene. The cards can be printed out later, too. By the last scene in the series, the adventurer has been trapped, and the writer must use his wits to write an escape.

After the writer has completed his adventure and has made all his notes, he moves on to a word processor mode to create a four-page story from the notes. The notes are available onscreen while he writes, but otherwise this creative exercise is most traditional: working from notes to create a story.

A proofreader/editor is included on the disk. This feature pinpoints potential errors, citing rules of grammar, punctuation, and style that might apply. The writer first decides which items he or she wants the proofreader to check for, and then decides if actual corrections are needed. When the story is satisfactory, it can be printed out. This requires an 80-column printer, and care must be taken in positioning paper. The program crowds 30 lines onto a page.

If you've ever taken a creative writing course, you'll be familiar with the approach: Show the students a picture and ask them to write a story about it. Sometimes the teacher has to ask leading questions to inspire ideas. That same method is at work here. For each picture, the program provides leading questions to which the students may refer for help when they're stuck. The questions are well-chosen, provocative without being difficult. The aim is to stimulate the writer's thinking for this story as well as to teach a technique he or she can use in the future.

> The Writing Adventure . . . *keeps the imagination flowing and provides some excellent guidance in writing.*

The Writing Adventure operates from two disks: the Story Starter (for the adventure and creating the notecards) and the Story Writer (for word processing and printing). In addition, you must have a separate data disk. This makes for a lot of disk-switching at the beginning and the end of a session with the program—and that is cumbersome. It is also a bit confusing, but if you follow the screen prompts precisely, the program performs as promised.

The manual provides good instructions, along with plenty of warnings about the important technical points of working this program. There is, however, one point which could be more clearly defined. Although stories are separately identified so that any one can be recalled from a data disk, it is not so with the notecards. Only the most recent set of notecards saved to a particular disk is accessible. This means that if you're working more than one adventure at a time—which isn't too likely—or if more

than one person is working on his or her own adventure—highly likely, particularly in a classroom setting—you need a separate data disk for each adventure.

Story Writer's word processor is a little unusual if you're used to others. It erases rather than deletes, but after making a correction, you can make up for leftover spaces by pressing SHIFT/CLR to reformat the story. Text can also be inserted, up to three lines at a time; then the story can be reformatted again.

The proofreader/editor warrants greater mention. An interesting list of "common mistakes" has been compiled for the computer to check for. These include homonym distinctions (to, too, two, or there, their, they're); the proper use of such pronouns as each/every/any; and correct placement of punctuation such as commas, hyphens, and semicolons. It takes a while for the proofreader to scan for mistakes, but the writer may choose which of seven error categories he or she wants the program to look for. Of course, it merely highlights potential problems, and then explains the applicable rule. Decisions about changes are left strictly to the writer. This exercise alone is educational.

The Writing Adventure is geared to develop writing skills in youngsters age 9 and up. The Story Starter with its terrific graphics and adventure format is guaranteed to intrigue the youngsters into taking the first steps. The questions will help focus the ideas the pictures stimulate so that the writer can take notes. And the adventure will keep the writer at it. However, it has to be hoped that once the notes are done, enough creative interest has been piqued to motivate the child to write the story. While the Playwriter series by Woodbury allows you to create a genuine bound book, thus making the finished product the incentive, *The Writing Adventure* runs the risk of using up its incentive with the first segment. For some, this may mean that parental or teacher encouragement is required to get the the writer to complete his or her story. For others, the thought of turning the notes into a coherent story may be enough to keep at it.

The Writing Adventure is a fine package for home or school. It keeps the imagination flowing and provides some excellent guidance in writing. If you're a parent, especially one who appreciates the need to know how to write but doesn't feel confident teaching a child how to do it, this program offers a wonderful, entertaining solution.

—David and Robin Minnick

DLM
1 DLM Park
Allen, TX 75002
$59.95

Create With Garfield

Create with Garfield is one of the easiest scene-creation packages available for the Commodore 64. Like other educational creativity packages, it allows users to draw scenes on their own, but unlike most others it offers an alternative. The program contains a number of predrawn scenes and characters, which, along with a good interface, enable the student to create a Garfield scene within minutes.

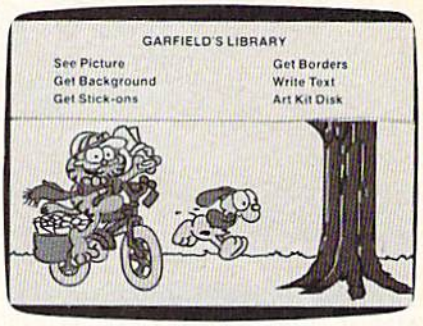
The idea of *Create with Garfield* is to stick pictures onto a background. Backgrounds on the disk include an empty room, a table, a tree, and a fence. Once you have decided on a background, you go to the Get Stick-Ons menu to select a foreground figure.

The variety of predrawn backgrounds and stick-ons makes the package extremely appealing to children, who can simply boot up the program and start making pictures.

Stick-ons include Garfield, Odie, Jon, and friends Arlene, Nermel, and Pooky—all from the popular "Garfield" cartoon series. Each figure is shown in several poses, and you select them one at a time. Other stick-ons include Props such as various types of food (this is Garfield, after all), a picture of Garfield, and several quotes typical of the cartoon cat. You can also call up thought balloons of various sizes in order to write your own captions.

If you exhaust the backgrounds and props included in the software, you can create your own using a KoalaPad drawing tablet and software. By far the most difficult aspect of using *Create with Garfield*, this feature also allows you the most flexibility. For those who can draw or trace, or for those who have built up libraries of *KoalaPaint* pictures, this portion of the package will be particularly useful. For others, though, it may be unnecessary. Since you can write your own captions, and since the major Garfield characters are presented in several poses, running out of new combinations will take quite a while. The variety of predrawn backgrounds and stick-ons makes the package extremely appealing to children, who can simply boot up the program and start making pictures.

So what can you do with the pictures you create? Well, first, you can



simply enjoy them on the screen. You can save your work to a data disk, so you can show your work later to friends. But *Create with Garfield* allows you to print your work in several ways. You can print the cartoon on a sheet of paper, print it as a poster, or print it as a label. The documentation suggests creating I.D. tags for school supplies, name cards for parties, personalized stationery, and signs, to name just a few possibilities. Another option is to link your cartoons together in an "electronic comic." This feature, which is possible only when you format the data disk from within the *Create with Garfield* program, automatically displays the cartoons in the order you have saved them to the data disk. And if that's not enough, the manual suggests several related activities, which will be useful mainly for teachers.

Create with Garfield is useful and fun. Impressive for its ability to get the user creating shortly after boot-up, it allows for a considerable amount of flexibility. Any child of school age should be able to use it easily, and Garfield fans of any age should find it appealing. For those who like creativity programs that encourage and do not intimidate, I recommend it highly.

—Neil Randall

DLM
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Allen, Texas 75002
$39.95

simple answers to common questions

Tom R. Halfhill, Staff Editor

Each month, COMPUTE!'s Gazette tackles some questions commonly asked by Commodore users. If you have a question you'd like to see answered here, send it to this column, c/o COMPUTE!'s Gazette, P.O. Box 5406, Greensboro, NC 27403.

Q. I'm wondering if it's possible to recover a disk. I went to delete a program with SCRATCH and used NEW by accident. There were at least 20 programs on the disk. They weren't big ones, but they were important to me.

A. Sounds like a lost cause. The Commodore disk command NEW (abbreviated N) completely reformats the disk, erasing any information that was stored there. (Don't confuse this with the BASIC command NEW, which erases the program currently in memory without affecting the disk.) If you don't have any backups, your programs are gone forever.

However, there is an outside chance that the data is recoverable, depending on how you entered NEW. Here is the most common syntax:

```
OPEN 15,8,15: PRINT#15,"N0:diskname,id": CLOSE 15
```

This form of NEW completely erases and reformats the disk, giving it the new *diskname* (up to 16 characters) and the *id* (2-character disk identifier) you specified. Any previously stored data is not recoverable. But, if the disk was previously formatted, NEW can also be entered like this:

```
OPEN 15,8,15: PRINT#15,"N0:diskname": CLOSE 15
```

Notice the difference: No *id* is specified. This is known as the fast-formatting option. It takes a shortcut and reformats by simply clearing out the disk's directory and block allocation map—two areas where the disk's contents are indexed and organized. The actual data on the disk is not erased; that's why this form of NEW is faster. (It works only if the disk has been previously formatted, however.)

Since you intended to use the SCRATCH command (abbreviated S) instead of NEW, it's possible that you inadvertently used the fast-formatting option, which resembles the syntax of the SCRATCH command (OPEN 15,8,15: PRINT#15, "S0:*filename*": CLOSE 15). Theoretically, therefore, your programs are recoverable.

Unfortunately, the job is very difficult and requires a thorough understanding of the way information is stored on the disk. Using a sector-level disk editing utility, you have to examine each sector on the disk and rebuild the directory piece by piece, then use a VALIDATE command to rebuild the block allocation map. That could take hours, even for an expert, and probably isn't worth the trouble unless the lost data is extremely valuable.

In the future, be sure to make backup copies of your important disks and keep them in a safe place.

Q. I'm curious. What's the most common question you receive for "Simple Answers To Common Questions"?

A. The answer to that question really *is* simple: Questions about recalcitrant printers. Most letters can be summed up like this:

"I've got a Commodore 64, an XYZ-2000 printer, a Bitbucket-99 printer interface, and HardSoft's *WordMangler* word processing software. When I try to print underlined boldface italics in near-letter-quality condensed mode with superscripts and subscripts, all I get is garbage. I've written to Commodore, the XYZ Corp., Bitbucket Inc., and HardSoft about my difficulty. But either they don't reply, or they blame one of the other companies for the problem. Please tell me the solution."

Unfortunately, there's not much we can do with these letters. The problem is caused by the complex interaction between the computer, printer interface, printer, and software. Given the amount of hardware and software available for Commodore computers, there must be hundreds of possible combinations. Although we have a variety of equipment, we can rarely duplicate the reader's setup exactly, so we can't begin to find the answer.

The manufacturers usually can't help, because they usually can't duplicate the problem, either. And the manufacturers may well be right when they blame each other. After all, their product probably works fine by itself or when used with familiar components in their test lab. They can't always anticipate the eccentricities of other links in the chain.

So what's the solution? First, take preventative measures. Before assembling a computer system, try to make sure all the components (including the programs you anticipate buying) work together in harmony. If you buy your system from a full-service dealer, ask to see it working *as a system*—especially the printer, printer interface, and any software that depends heavily on the printer, such as a word processor.

What if you've already bought your system? Read and reread your manuals, experiment, seek help from a user group, and try posting messages on bulletin board systems (BBSs) and information services. Chances are that someone before you has encountered and solved your problem; it's just a matter of finding that person.

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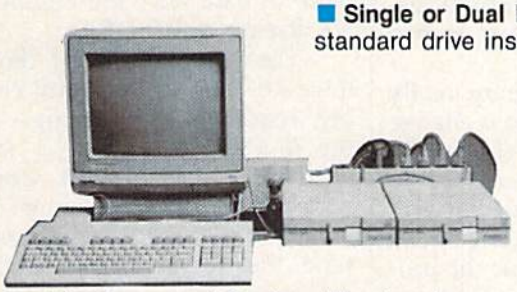

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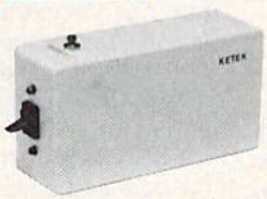

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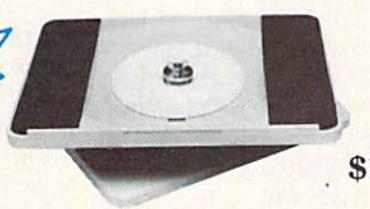

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BASIC for beginners

Using RESTORE And TAB

Larry Cotton

Let's do things a little differently this month. For a change of pace, we'll start with a BASIC program and let the explanation follow. We'll create a little "Rolodex" program, which is sort of a miniature database—and in so doing, will introduce a new BASIC command, RESTORE, and a new BASIC statement, TAB.

Most of us are familiar with a Rolodex—a card file with names, addresses, and telephone numbers, usually in alphabetical order by last name.

A database, for the uninitiated, is really a computerized filing system. It can be as elaborate as an inventory system for a large corporation, or as simple as a personal telephone directory.

Commercially available databases are very sophisticated and talk to the disk drive a lot. With our Rolodex program, we'll use the READ and DATA statements, which we've studied in the last two columns, to take the place of communication with the disk drive. Here's our program:

```
10 PRINT"{CLR}"
20 RESTORE:N$="":INPUT"NAME";N
   $
30 IF N$=""THENPRINT:GOTO100
40 READA$,B$
50 IF A$="NL"THEN PRINT:PRINT"
   NOT LISTED":PRINT:GOTO20
60 IF A$<>N$ THEN 40
70 PRINT:PRINT B$
80 PRINT:GOTO 20
100 READ A$,B$:IF A$="NL"THEN 200
110 PRINT A$;TAB(7);B$:GOTO100
200 PRINT:PRINT"PRESS ANY KEY
    TO CONTINUE"
210 GET R$:IF R$="" THEN 210
220 GOTO 10
1000 DATA LARRY,285,JIM,280,KE
   NNY,265,GORDON,207
1010 DATA TERRY,209,JOHN,204,C
   HRIS,289,NL,NL
```

This program was written to display telephone extension numbers in an office. Type it in, being sure not to type a space between TAB and the open parenthesis in line 110, and then run it. When you see the prompt NAME?, type JOHN and press RETURN. You should see 204 and another prompt.

When you see the NAME? prompt, if you don't remember whether the person you want to dial is indexed or not—or perhaps you've forgotten how to spell a name—just press RETURN to display a list of all the names in two neat columns.

To make this program really useful, all you have to do is change the names and numbers (and probably add more DATA statements). Or perhaps you'd like different data altogether. But we're getting ahead of ourselves. Let's see how the program works.

Line 10 just clears the screen. If you want different colors for the screen and printing, look in your user's manual for instructions on how to change them.

The RESTORE Command

We encounter one of our new BASIC commands in line 20. Since the program will depend on reading through the names and numbers each time a name is typed in, we must be able to read the data more than once. The command to do that is RESTORE, which resets the computer to read the data from the beginning again.

Here's how the computer looks up a number after we type in the name: First, line 20 presents the NAME? prompt with the INPUT statement. When we type something, the computer stores it as N$. If we just press RETURN, N$ becomes a null (empty) string, which we've learned is expressed as quotation marks with nothing in between (" ").

Line 30 checks to see if N$ is a null string. If so, the program prints a blank line and jumps to line 100.

Line 40 reads two pieces of data—A$ (the name) and B$ (the number). Let's skip line 50 for a moment and come back to it later.

Line 60 uses an IF-THEN statement to check the first piece of data, A$, against the typed-in name, N$. If it isn't the same, control is sent back to line 40 to read the next two pieces of data. Notice we don't need to bother with the second piece of data, B$—the number—if A$ doesn't match N$.

The computer loops through lines 40–60—reading and checking, reading and checking—until the IF-THEN statement is failed: N$ finally matches A$. Control goes to line 70, which prints B$—the number—then to line 80, which sends the program back to line 20 to ask for another name. The two PRINTs in lines 70 and 80 just print blank lines on the screen.

Now for line 50. This line is used in case the computer has read through the entire list of names and has not succeeded in making a match. Remember, we're reading *two pieces of data* at a time. We must make provision for letting the computer know there's no more data to read. So we put NL,NL at the end of the data as a flag. You can use anything you wish as long as you test for it in line 50. If NL is read as A$, NOT LISTED is printed and the program goes back to line 20 for another try.

When are lines 100–220 used? We need a way to show all the cards in the database. The best way is to read all the data and print the names and numbers on the screen. That's exactly what lines 100 and 110 do, until line 100 reads NL, NL; at that point there's no more data to be read.

We also need a pause to hold the names and numbers on the screen for viewing. We could use a FOR-NEXT timing loop, but the timing probably would not correspond to the length of the list.

What's the best way to pause as long as the user wishes? Use GET (see the June column). Line 210

goes into an infinite loop until any key is pressed, at which time line 220 is executed. The control is sent to line 10, which clears the screen, restores the data pointer to the beginning, and presents the NAME? prompt once again.

Customizing

If you'd like to tailor this program to your own needs, change the data starting at line 1000. For instance, if you have a record or tape collection, some of the data lines could look like this:

```
1000 DATA THOMPSON TWINS,
     HERE'S TO FUTURE DAYS,
     21,MIKE CROSS,CAROLINA
     SKY,22
1010 DATA PETER CETERA,
     SOLITUDE/SOLITAIRE,23,JIMMY
     BUFFET,FLORIDAYS,24
1020 DATA JIMMY BUFFET,GREATEST
     HITS,25,NL,NL,NL
```

The format of the data is up to you, but in this case it's organized by artist, album title, and album number. The number could correlate with, say, the order in which the album was acquired.

If you enter these lines and try to run the program without changing anything else, you'll quickly discover several bugs. Let's fix them. First, we need to read *three* pieces of data instead of two, so change line 40 to:

```
40 READ A$, B$, C$
```

Change line 100 to:

```
100 READ A$, B$, C$: IF A$ = "NL"
    THEN 200
```

Also be sure to put three dummy data items as your last data flag (see line 1020 above).

Next, since you probably own several albums by the same artist, all should be displayed—unlike the Rolodex program, where we wanted to display only the first match. Therefore we need to send control back to line 40 instead of line 20. Change line 80 as follows:

```
80 GOTO 40
```

This will go back to read the *next three* pieces of data—not back to the RESTORE at line 20, which starts reading the data from the beginning.

And a slight modification to our message in line 50 would be appropriate:

```
50 IF A$="NL" THEN PRINT:
   PRINT"NO MORE LISTINGS":
   PRINT: GOTO 20
```

The TAB Statement

Another bug should be very obvious: Something's wrong with the just-press-RETURN routine at lines 100–110. Part of the trouble is with the TAB statement.

TAB works with the PRINT statement, just like a typewriter tab: It causes the printing to start to the right of the left screen border by the number of spaces specified by the value inside the parentheses.

In our old line 110, we set the tab to seven spaces, which was determined by the length of the longest name—Gordon—plus one space. That placed our telephone number column seven spaces to the right of the left screen border.

In our new data, the longest name of the recording artist—Thompson Twins—is 14 characters (counting the space). Adding one more space yields a TAB value of 15. Thus line 110 becomes:

```
110 PRINT A$;TAB(15);C$: GOTO 100
```

Remember the syntax of TAB: There's no space between TAB and the parentheses. You must decide how much information you want to display in the just-press-RETURN routine. In this case, line 110 prints the artist (A$) and the album number (C$) by that artist.

There's one more problem: Line 70 prints only the album's title, not its number. Change line 70 to:

```
70 PRINT: PRINT B$;TAB(22);C$
```

The tab value of 22 is set by the length of the longest name of the album title ("Here's to Future Days") plus one space.

Incidentally, the number in the parentheses after TAB can be as high as 255, but usually numbers less than the screen width (40) are used.

Next month we'll study TAB a bit more, mention another BASIC command that's very similar to it, SPC, and learn the ropes about strings.

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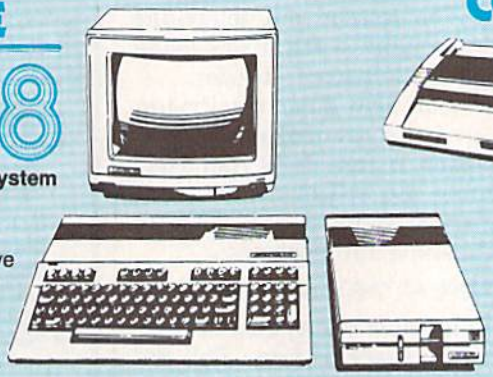

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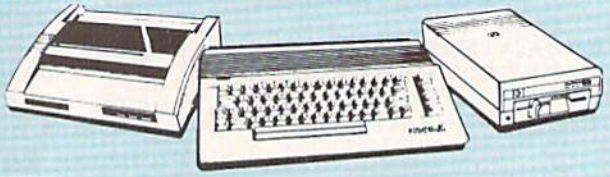

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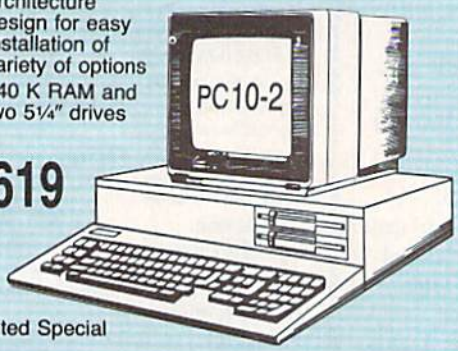

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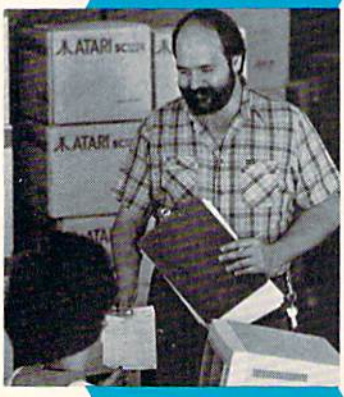

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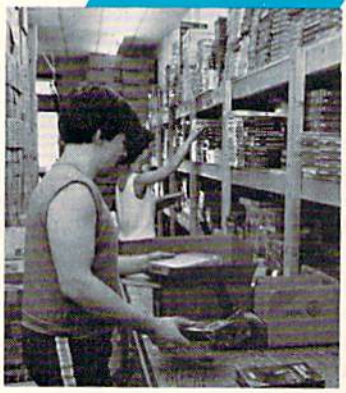

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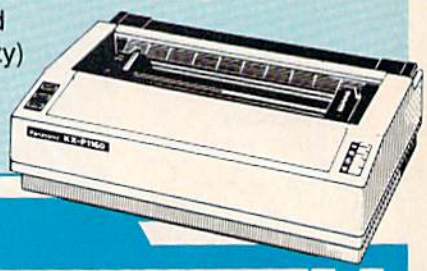

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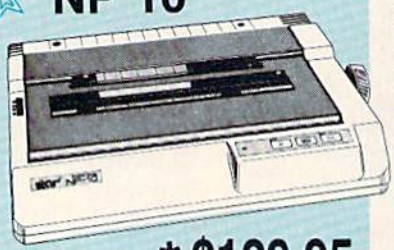

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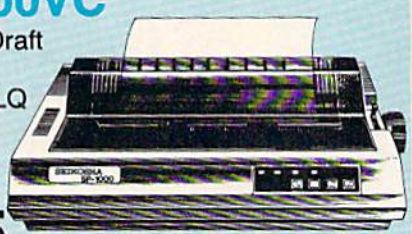

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Easy Character Movement

Clifford Dedmore

One powerful feature of the 64 is its ability to display user-defined character sets. Most BASIC programmers use a FOR-NEXT loop to copy the system's character set from ROM to RAM, and then make alterations on one or more characters. This process takes up to 30 seconds, though, so many people turn to machine language. If you don't know machine language, you may be able to find a routine for moving characters in a book or magazine, but I've found another way to move memory at ML speed.

The following BASIC program moves the character set from ROM to RAM at machine language speed by using a built-in routine located in the 64's operating system. The starting address, ending address, and new address for the move can be set by changing the variables in line 10. Lines 20 and 50 are mandatory when copying from the ROMs, but they are unnecessary if you're copying from one RAM location to another. Note that the variable E must be set to one more than the actual ending address.

```
5 C=6:POKE 53272,(PEEK(5327
  2)AND24Ø)OR2*C
1Ø S=53248:E=55296:N=12288
2Ø POKE 56333,127:POKE 1,51
25 L=E-S:EN=L+N
3Ø A%=L/256:A=L-256*A%:B%=(
   EN-A)/256:B=EN-256*B%-A:
   C%=(E-A)/256:C=E-256*C%-
   A
4Ø POKE 781,A%+1:POKE 782,A
   :POKE 9Ø,C:POKE 91,C%:PO
   KE 88,B:POKE 89,B%:SYS41
   964
5Ø POKE 1,55:POKE 56333,129
6Ø POKE 56,48
```

You can also use this technique to move the contents of other areas of memory. Just change line 10 to adjust the starting, ending, and new starting addresses. You can remove lines 20 and 50 if you're not moving the character set from ROM.

Why It Works

When you enter a program line, the 64 must move its variables higher in memory. It uses a simple memory-move routine to do this. To move our character set, we just have to trick the computer into moving our memory by setting certain system variables before the SYS statement.

New Characters

Add the following line to the program above:

```
7Ø FOR J=Ø TO 255:FOR K=Ø T
   O 7:POKE 14336+8*J+K,PEE
   K(12288+8*J+7-K):NEXT K,
   J
```

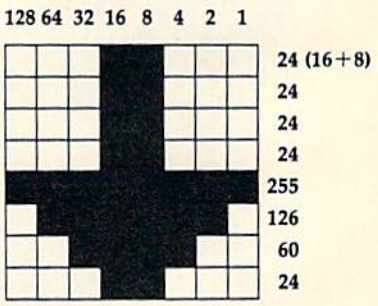
This is adapted from a program in *Programming the 64*, from COMPUTE! Books. It turns the lowercase character set into upside-down copies of the uppercase set. Press the SHIFT and Commodore keys simultaneously to see the new character set. The character set is copied from ROM to RAM in much less than one second. The modification of the lowercase set takes much longer, since all the work is being done in BASIC.

Let's design a character from scratch. Add the following lines, replacing line 70 above with a new line 70.

```
7Ø FOR J=12288 TO 12288+7:R
   EAD N:POKE J,N:NEXT J
8Ø DATA 255,129,129,129,129
   ,129,129,255
```

This program POKEs a character definition directly into the RAM character set. The new character is a box. It replaces the @ character—type @ to see it.

You can use an 8 × 8 grid to define your own characters. When you've decided which character you want to change, multiply the character number (the screen code value, not the ASCII value) by 8; then add the result to the starting address of the RAM character set. This will give you the address of the character definition. For example, C is character number 3. Multiply that number by 8 and add it to the address of the new character set to find the address of the definition of the character C. The following figure shows how characters are designed:



The definition shown is for a down-arrow character. Put the numbers from the right column into the DATA statement in line 80 of the example program above to see the arrow.

Other Possibilities

Now that you can move areas of memory at machine language speed without knowing machine language, you can put the high-speed movement routine to some other uses, such as moving sprite definitions, scrolling the screen, or moving all or part of one screen to another screen.

Dr. J's Bulletin Board

Fred D'Ignazio
Associate Editor

Dr. Ron Jones (known as "Dr. J" to his teachers) is Director of Staff Development for six dozen schools in Jefferson County, Alabama. Dr. J is like a shepherd; his job is to nurture a sprawling flock of Jefferson County teachers and help them grow and develop professionally.

Dr. J likes the personal touch, and he used to try to stay in touch with his teachers by telephone. But this was an unsatisfactory means of communication. Most of the time, teachers couldn't come to the phone because they were in their classrooms teaching. So how did Dr. J consult with them about his new training programs? Or about visiting speakers?

That was Dr. J's problem. His solution was to start an electronic bulletin board, perhaps the first board in the southeastern U.S. devoted exclusively to linking teachers for the purpose of communication, training, and professional development. According to Dr. J, "In a system such as ours, we have a lot of people who are on fast tracks. Communication is important, yet it needs to be done at everyone's convenience. The bulletin board makes that possible."

If you want to set up your own bulletin board but you're not a computer whiz, how do you get started? You could do what Dr. J did and look for a person who is already running a local board. That person is the key to helping you set up a board of your own. You can find the person you need by asking around at local computer stores. This is how Dr. J ran into John Sudderth, a Birmingham musician who runs a national bulletin board for Music Alley, a local electronic music store. Based on John's advice, Dr. J acquired an IBM-compatible computer with a hard disk drive (20 megabytes) to house the bulletin board. He bought a copy of *PCBoard*, which John customized for the Jefferson County schools. And he got county officials to install a phone line dedicated to the bulletin board.

An Electronic Pony Express

One morning in early April, Dr. J switched on his computer, and the bulletin board became a reality. Once it was up, it became an online pony express linking teachers all across the county—7 days a week, 24 hours a day. Any school with a modem and a computer—*any* computer—could dial the bulletin board number and log on.

Jefferson County already has a "pony," a delivery truck which cruises across the county carrying packages from school to school. The present-day pony is fine for carrying bulky items around, but it is not the way for teachers to stay in close touch or keep up with fast-breaking news. Now teachers can stay in touch using Dr. J's bulletin board.

To demonstrate his point, Dr. J had me conduct my interview for this column with his bulletin board. I called up the board using my Commodore 64, logged on, and sent a message to the SYSOP with my questions for the interview. I sent the message at my convenience—late one evening after my family was in bed. The next day, Dr. J replied: "I sat down at the computer at 7:25 this morning and started responding to some of the questions you raised. Since I have a busy day scheduled, I chose to get it done early. People in education run a hurried pace. Wouldn't it be nice to go home and then decide to use the computer you purchased at home to catch up on what's going on? Teachers all know that catching up during the school day is next to impossible."

Dr. J set up the bulletin board to link the 13 schools who were "working so hard" in the Jefferson County Multi-Media Classrooms Project. (See my recent COMPUTE! and GAZETTE columns.) This was a good first step. By keeping the number of schools limited at first, Dr. J and his teachers have been able to iron out a host of technical problems with modems, communications software, and phone lines shared with school lunchrooms, health rooms, and day cares.

Second, Dr. J started the board with teachers who *wanted* to communicate because they were working on a project together. He noted, "You need a bunch of go-getters who will act as leaders to inspire other teachers to use the board."

What is the future of educational bulletin boards? According to Dr. J, it is wide open. He has already spoken with Dr. Ronald Wright at the Alabama State Department of Education. He and Dr. Wright are talking about linking the Jefferson County Board with a statewide board that Dr. Wright is setting up. Dr. J also sees the board as an electronic "telepublishing" medium. Teachers, administrators, and trainers can load news stories on the board directly from their home or classroom; then Dr. J can pull the stories off the board at his office and create a professional-looking, county-wide newsletter using desktop publishing software.

According to Dr. J, "We are building this bulletin-board airplane as we fly it, but we know we're on the right track because the teachers keep the board buzzing." If you'd like to learn more about Dr. J's board, write: Dr. Ronald Jones, Director, Staff Development; JeffCoEd Annex; 801 Sixth Ave. S.; Birmingham, AL 35233.

machine language for beginners

Richard Mansfield
Editorial Director

When you buy your computer, it already knows how to do thousands of things. Its ROM chips are filled with programs and routines which run the BASIC language, access the peripherals, keep time, and so on. As a machine language programmer, there will be many times when you can utilize these useful, prewritten routines. But it's not as simple as just jumping to a ROM subroutine. There are preconditions: You often need to set up registers, call preliminary routines, and do other housekeeping before you can take advantage of this valuable shortcut.

If you've been perplexed about how to access your ROM chips' library of subroutines, COMPUTE! Books has recently published an excellent book on this topic. Written by staffers Todd Heimarck and Patrick Parrish, *Machine Language Routines for the Commodore 64/128* is arranged like a dictionary with over 200 examples showing you how to accomplish everything from sprite manipulation to disk I/O. Each example is thorough, cross-referenced to related routines, and, above all, easy to understand and use in your own programs. Here's an example from the book which shows you how to manipulate the SID chip in various ways.

SIRENS

Name

Produce a siren sound

Description

SIRENS causes the SID chip to emit an extended sirenlike sound. At certain intervals in a game, you could use it to signal to the user that he's reached a higher level or achieved bonus points. Or you could use it as fanfare at the conclusion of the game.

Prototype

1. Clear the SID chip with **SIDCLR**.
2. Set up the necessary SID chip parameters for voice 1. Set sustain/

Routine

```
C000                    ZP      =   251
C000                    JIFFLO  =   162     ; low byte of jiffy clock
C000                    FRELO1  =   54272   ; voice 1 frequency control (low byte)
C000                    FREHI1  =   54273   ; voice 1 frequency control (high byte)
C000                    VCREG1  =   54276   ; voice 1 control register
C000                    SUREL1  =   54278   ; voice 1 sustain/release register
C000                    FRELO3  =   54286   ; voice 3 frequency control (low byte)
C000                    VCREG3  =   54290   ; voice 3 control register
C000                    CUTLO   =   54293   ; lower three bits of filter cutoff frequency
C000                    CUTHI   =   54294   ; filter cutoff frequency (high byte)
C000                    RESON   =   54295   ; filter/resonance control register
C000                    SIGVOL  =   54296   ; volume and filter select register
C000                    RANDOM  =   54299   ; reads high byte of voice 3
C000                    BASFRE  =   15000   ; base frequency to add to voice 3
                                            ;
C000  20  64  C0  SIRENS  JSR   SIDCLR      ; go clear the SID chip
C003  A9  F0              LDA   #$F0        ; set full sustain/fastest release
C005  8D  06  D4          STA   SUREL1
C008  A9  21              LDA   #%00100001  ; select sawtooth waveform (voice 1) and
                                            ; gate sound
C00A  8D  04  D4          STA   VCREG1
C00D  A9  02              LDA   #2          ; give voice 3 a frequency
C00F  8D  0E  D4          STA   FRELO3
C012  A9  10              LDA   #%00010000  ; select triangle waveform (voice 3)
C014  8D  12  D4          STA   VCREG3
C017  A9  AF              LDA   #%10101111  ; disconnect voice 3 output/select band-
                                            ; pass/max. volume
C019  8D  18  D4          STA   SIGVOL
C01C  A9  01              LDA   #%00000001  ; no resonance and filter voice 1
C01E  8D  17  D4          STA   RESON
C021  A9  00              LDA   #0          ; select band-pass cutoff frequency of 616
C023  8D  15  D4          STA   CUTLO
C026  A9  4D              LDA   #77
C028  8D  16  D4          STA   CUTHI
C02B  A2  00              LDX   #0          ; as an index in SIRLOP
                                            ; Calculate voice 1 frequency from voice 3
                                            ; frequency (high byte).
C02D  A9  00    SIRLOP    LDA   #0          ; initialize voice 1 frequency (high byte)
C02F  85  FC              STA   ZP+1
```

```
C031  AD 1B D4        LDA  RANDOM   ; get voice 3 frequency (high byte)
C034  85 FB           STA  ZP       ; store in zero page as low byte
C036  06 FB           ASL  ZP       ; multiply it by 32, double low byte
C038  26 FC           ROL  ZP+1     ; then high byte
C03A  06 FB           ASL  ZP       ; double four more times
C03C  26 FC           ROL  ZP+1
C03E  06 FB           ASL  ZP
C040  26 FC           ROL  ZP+1
C042  06 FB           ASL  ZP
C044  26 FC           ROL  ZP+1
C046  06 FB           ASL  ZP
C048  26 FC           ROL  ZP+1
                      ; Add a base frequency of 15000 to this.
C04A  A5 FB           LDA  ZP       ; low byte first
C04C  18              CLC           ; for addition
C04D  69 98           ADC  #<BASFRE ; add low byte of base frequency
C04F  8D 00 D4        STA  FRELO1   ; and store in voice 1 frequency register
                                    ; (low byte)
C052  A5 FC           LDA  ZP+1     ; then high byte
C054  69 3A           ADC  #>BASFRE ; add high byte of base frequency
C056  8D 01 D4        STA  FREHI1   ; and store in voice 1 frequency register
                      ; Delay four jiffies.
C059  A9 04           LDA  #4       ; add four jiffies to jiffy clock reading
C05B  65 A2           ADC  JIFFLO
C05D  C5 A2    DELAY  CMP  JIFFLO   ; and wait for four jiffies to elapse
C05F  D0 FC           BNE  DELAY
C061  CA              DEX           ; for next note
C062  D0 C9           BNE  SIRLOP   ; repeat SIRLOP 256 times
                      ;
                      ; Fall through to SIDCLR to stop sound and
                      ; RTS.
                      ; Clear the SID chip.
C064  A9 00    SIDCLR LDA  #0       ; fill with zeros
C066  A0 18           LDY  #24      ; as the offset from FRELO1
C068  99 00 D4 SIDLOP STA  FRELO1,Y ; store 0 in each SID chip address
C06B  88              DEY           ; for next lower address
C06C  10 FA           BPL  SIDLOP   ; fill 25 bytes
C06E  60              RTS           ; we're done
```

release to $F0, select a sawtooth waveform, and gate the sound.

3. Assign a low frequency and a triangle waveform to voice 3.
4. Disconnect output from voice 3. At the same time, select band-pass filtering and the volume.
5. Store %00000001 in the filter/resonance control register to filter voice 1 without resonance.
6. Select a band-pass filter cutoff frequency.
7. In SIRLOP, multiply the output of voice 3 by 32 and add in a base frequency of 15000. Store the low and high bytes of the resulting frequency in voice 1.
8. Pause four jiffies before getting another frequency value for voice 3.
9. Repeat SIRLOP 256 times. Then clear the chip and RTS.

Explanation

In this routine, the output from voice 3 modulates the frequency of voice 1. In the process, voice 3 is not actually heard. As a result, no SID attack/decay or sustain/release parameters are required for this voice. Its only use is in providing a frequency value for voice 1.

After disconnecting the audio output of voice 3, the waveform (high byte only) for this voice is read from RANDOM. Since a triangle waveform is selected for voice 3, the numbers returned by RANDOM increase gradually from 0 to 255, and then work down to 0 again. In order to get a suitable frequency range for voice 1, these values are multiplied by 32 and then added to a base frequency of 15000.

Another feature of **SIRENS** is its use of band-pass filtering. With the band-pass filter implemented, frequencies on either side of a cutoff frequency are diminished in volume.

Since only 11 bits on the two-byte cutoff register are addressed, the cutoff filter value can range from 0 to 2047. Although the number stored in this register is proportional to the cutoff frequency (in this case, 616), the value itself does not represent an actual frequency. Probably the best way to achieve the effect you're looking for with this register is through experimentation.

Todd Heimarck
Assistant Editor

Let's say you're not a programmer, but you'd like to learn to program. If you take a class in beginning BASIC, you'll probably start off with programs like these:

```
10 PRINT "MY": PRINT "NAME"
20 PRINT "MY",: PRINT "NAME"
30 PRINT "MY";: PRINT "NAME"
```

```
10 FOR X = 10 TO 50 STEP 2
20 PRINT X; "TIMES TWO IS"; X*2
30 NEXT X
```

These are certainly useful examples. The first program shows how to use punctuation at the end of a PRINT statement. The second illustrates how a FOR–NEXT loop runs, with output to show what's going on inside the program.

But a good solid 1000-line program is not just a 2-line program expanded by a factor of 500. To put it another way, knowing how to construct a grammatical and correctly spelled sentence is not the same as knowing how to write a novel. A novel has characters, plots and subplots, among other elements. It's more than just a collection of sentences. Likewise, a large program is more than just a long list of commands to be executed one at a time.

So how do you write a nontrivial program? There are two approaches to program design, both of which are useful.

The Big Picture

First example: You've typed in and saved to disk a list of recipes or an inventory of baseball cards and you want to alphabetize the list. An excellent strategy in this case is to look at the program as a whole. Consider the following program:

```
10 REM GOSUB1000: REM READ FILE
20 REM GOSUB2000: REM SET UP
   POINTERS
30 REM GOSUB3000: REM
   ALPHABETIZE
40 REM GOSUB4000: REM PRINT
   RESULTS
50 END
```

Four lines and an END statement, and the structure of the program is established. I'd suggest doing the first and fourth routines before the second and third. If you read the file and print the results (without alphabetizing), you can check to see that all the data is being read from disk into memory.

The first subroutine might break down into the following lines:

```
1000 REM GOSUB 1100: REM INPUT
     FILENAME
1010 REM GOSUB 1200: REM OPEN
     FILE & CHECK FOR ERRORS
1020 REM GOSUB 1300: REM READ
     FROM FILE
1030 REM GOSUB 1400: REM CLOSE
     FILE
1040 RETURN
```

Why all the REMs? They hold the place of the GOSUB, but they don't do anything (yet). As you add a routine, you can delete the REM. The routine at line 1000 is outlined, so you can erase the REM in line 10.

This process would continue, with each routine sketched out in REM statements. Then you'd either write a routine or further divide the program into smaller steps.

The official name for this strategy is *top-down programming*. You begin at the top and gradually fill out the program's outline.

Starting At The Bottom

Second example: Let's invent a text adventure game with trolls, treasures, dungeons, and all of the usual accouterment. If we took a top-down approach, we'd create a general plan of action, draw some maps, invent some monsters, and get things organized.

But we won't. The key to a text adventure is the command line, where the player types something like *go west*. The program takes apart the sentences and tries to determine what the player wanted to do. All text adventure games do this with a routine called a *parser*. Let's begin with the parser routine.

Sentences like *fight dragon* and *wear armor* start with an action and end with an object, so we need at least two vocabulary lists and some way to cross-reference acceptable commands. The player can fight a dragon, but can't fight a door. Maybe we should check the action first and narrow down the list from there, so if the player types *fight*, we go to the list of fightable things.

The list of actions might be in alphabetical order. The program will search from start to finish, looking for a match. But what about a single-word command like *west*? It would be at the end of an alphabetical list, slowing down the search. There are two solutions: We could search the list from beginning to end, putting the most common commands at the start of the list. Or we could use a binary search, which is similar to the way you look for a name in a phone book, starting in the middle and gradually narrowing down the scope of the search. In this case, you'd begin searching in the middle of the alphabetized list and throw out one half or the other, depending on where the command is located.

Another key question is how time works. Let's say a snarling hobgoblin appears. Do we give the player time to do things like *look, inventory, list spells, help, wear armor* before deciding to run away? Maybe yes, maybe no.

As you may have guessed, this second approach to designing a program is called *bottom-up* programming and, in this case, it seems to make more sense than the top-down strategy.

the geos column

Helpful Hints

Chris T. Asselin

Even in the user-friendly world of* GEOS, *experience remains the best teacher. This month, we present some helpful techniques collected by an experienced* GEOS *explorer.

To begin, let's look at a few important tips for new *GEOS* users.

• If you think you've accidentally ruined the original *GEOS* disk, you may be able to fix it yourself. Refer to the manual for details of the fairly simple repair process.

• Keep two disk backups of *GEOS*, one in your disk holder and the other in a place hidden away from heat, cold, moisture, and magnetic sources.

• Make separate *geoWrite* and *geoPaint* work disks; this leaves more room for files that you create with the programs. Also, reserve another work disk for text scraps and note files. Data on this disk can later be extracted and stored on *geoPaint* or *geoWrite* disks.

• The duplicate option in the file menu is useful for copying PRG, SEQ, REL, and USR files.

• When creating and naming files, use only capital letters when typing the names into dialog boxes. On most screens, it's very difficult to read the lowercase letters in the typeface used for filenames.

• Be careful when selecting options from menus. In some cases, a file deletion option lies right next to a less dangerous choice. The potential for trouble is obvious.

• If you cut or copy any piece of graphics or type and put it into a photo or text scrap, it will overwrite what was previously there.

Printing Pointers

GEOS assumes that documents will be printed on printers having a resolution of 80 dots per inch. If your printer doesn't conform to this standard, a full-screen *geoWrite* or *geoPaint* document may lose a portion of its right side during printing. To avoid the problem, restrict your *GEOS* documents to the left three-quarters of the total available screen area. Before starting any significant work, make a test of exactly how far to the right you can go. Keep track of the results by using the ruler in *geoWrite*. For *geoPaint*, place a fully printable reference line at the top of your document.

If you print a file from the Desktop by dragging it to the printer icon at the bottom of the screen, be careful. A moment's inattention can result in your file falling into the Trash Can and being erased.

Text Tips

After using italic text, an immediate switchover to plain text will usually result in part of the italicized letters being cut off. The truncated letters will also print incorrectly. Avoid the problem by simply adding a space or two before changing style. (You may see a similar effect in italic type even without changing style. This affects the screen image only. The printout will be normal.)

Use *geoWrite* to make a printed page showing the different sizes and styles of type fonts that are available in your system. Keep this chart on the wall near your computer. A text reference of this kind is helpful, since the appearance of a printed letter is often quite different from its screen counterpart.

Ideas For Icons

You can reposition the file icons that appear on the Disk Notepad. Each page of the pad offers eight icon locations—two 4-icon rows, one above the other. *GEOS* always utilizes these icon positions in strict order, top left to bottom right. To make a change, pick up the icons you want to move; then drag them down to the margin at the bottom of the Disk Notepad. Once there, you can drag them back to the pad to set up your preferred arrangement. This is a convenient feature, especially for grouping together icons for multipart programs.

You can use the "Icon Changer" program—found in the January 1987 Gazette—to give your own files a unique look. Just enter the name of the file (for example, ESSAY 1 or STORY 5), and proceed from there.

You may want to put the icon for a frequently used program in the first icon position on page one of the Desktop Notepad. From then on, you can load this file from BASIC by typing LOAD"*",8 (for BASIC) or LOAD"*",8,1 (for machine language).

Painting Plans

The circles produced by *geoPaint*'s circle option look like ovals on the screen. This distortion is intentional, and it results in perfectly round circles when the file is printed.

After establishing a text area in *geoPaint*, you may find that it's not what you wanted. Unfortunately, text boxes can be very persistent. Just reselect the text option from the menu to remove the existing box, and start anew.

In *geoPaint*'s pixel mode, you can move rapidly around the drawing window by using the scrolling arrows. This returns you to the normal screen, where you can again select an area for pixel editing.

After creating a *geoPaint* picture, save another copy of the file before making any major changes. This is an essential safeguard since the Undo option can undo only the single, immediately previous stage of your artwork. In *GEOS*, Undo cannot be used to reverse the effect of an Undo.

Next month, we'll begin a detailed two-part article on writing assembly-language programs for GEOS.

Scott and Keith Elder

Have your say in a big way with this program that produces text twice the size of the normal 64-character set.

Sometimes it's nice to spice up the screen with an unusual character set. "DoublePrint" gives you something really unusual—a 20-column character set.

Why would anyone switch from 40 columns to 20? One reason is that the larger the word, the easier it is to read. It may be just the trick you need to capture someone's attention.

With DoublePrint installed in memory, it's easy to switch between 20 and 40 columns, either in direct or program mode.

Typing It In

DoublePrint is a machine language program in the form of a BASIC loader. Since it requires accurate typing, use the "Automatic Proofreader" program found elsewhere in this issue when you enter it. Be sure to save a copy to tape or disk when you've finished typing.

When you're ready to see how a screen with 20 columns looks, load the program and type RUN. After the ML program is POKEd into memory, you'll see a genuine 20-column screen. Two SYS locations are printed on the screen. The first (SYS 49152) is used to switch to 20 columns; the second (SYS 49391) is used to switch to 40 columns.

Type LIST. As you type, you'll see strange symbols. Press RETURN. Your program will list in 20 columns.

The reason you saw strange characters when you typed LIST concerns the way DoublePrint works. As far as the computer is concerned, the 20-column screen is not real. DoublePrint intercepts the CHROUT routine. Whenever the computer prints to the screen (excluding when you are typing), DoublePrint prints each letter twice—once in normal mode and once in reverse mode. The character set is redefined so that the normal character definition holds the left half of the letter and the reversed character definition holds the right half of the definition. When the two halves are printed next to each other by the new CHROUT routine, one large character is the result.

Try this: Type an *A*. Then, switch to reverse mode (CTRL-RVS ON) and press *A* again. The whole letter appears. Now try an immediate mode command. Go to a blank line and type PRINT "HELLO". Again, you won't be able to read what you're typing. When you press RETURN, HELLO is printed to the screen correctly.

Now go back to 40 columns by typing SYS 49391. You'll see more clearly how the 20-column screen is constructed.

The program loads at 49152 ($C000). If you want to use the 20-column mode in your own BASIC programs that require keyboard entry from the user, you'll need to write your own input routine using the GET command rather than INPUT.

See program listing on page 83.

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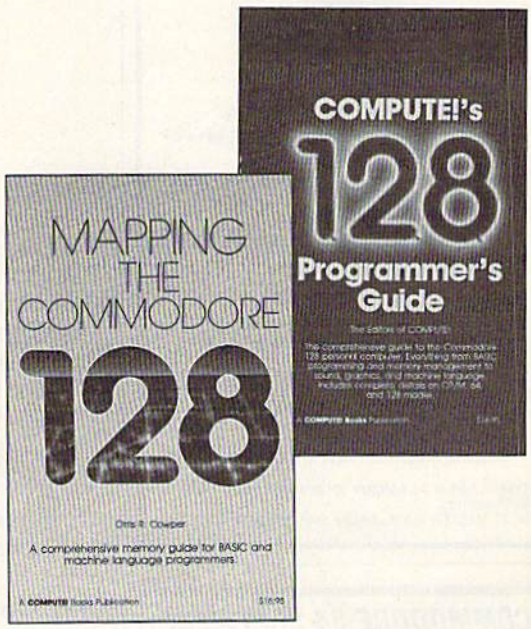

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User Group Update

Caroline D. Hanlon, Editorial Assistant

This list includes updated entries to our annual "Guide to Commodore User Groups," which last appeared in the May and June 1987 issues.

When writing to a user group for information, please remember to enclose a self-addressed envelope with postage that is appropriate for the country to which you're writing.

Send typed additions, corrections, and deletions for this list to:

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Attn: Commodore User Groups

User Group Notes

Newark Computer Users Group (NCUG), Inc. has changed its address to 11 Allandale Dr., Apt. L12, Newark, DE 19713.

The correct address for **South Orange Commodore Klub (SOCK)** is 25401 Champlain Rd., Laguna Hills, CA 92653.

New Listings

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Gilpin County Commodore Users, 2881 Dory Hill Rd., Golden, CO 80403

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Savannah Commodore User Group, P.O. Box 1171, Savannah, GA 31402-1171

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Mid-Kansas Commodore Club, 1509 Hubbard, Great Bend, KS 67530

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Southwest Missouri Commodore Users Group, 1510 South St., Aurora, MO 65605

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Renton Commodore User Group, 142 Blaine Ave. NE, Renton, WA 98056

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Impossible Scroll

J. Kelly

Even if you're a veteran Commodore 64 user, there may still be a few tricks that you haven't seen. Here's one—a program that puts fine-scrolling text in the screen border. A disk drive is required.

Text resides within certain boundaries on the Commodore 64. It sits in a screen "window" of 40 columns by 25 rows. The VIC chip allows you to vary the size slightly—the horizontal size can be changed to 38 columns; the vertical, to 24 rows. These changes were included in the VIC chip to allow smooth-scrolling letters (or redefined characters) to appear on the screen piece by piece instead of popping onto the screen fully formed.

But it is possible to trick the VIC chip into displaying text and graphics even further down the screen into the border's domain. "Impossible Scroll" does just that.

Typing It In

Program 1 is written in machine language, so you'll need to type it in with "MLX," the machine language entry program found elsewhere in this issue. When MLX asks for a starting and an ending address, respond with the following values:

Starting address: C000
Ending address: C307

Be sure to save a copy to disk before exiting MLX. Use the name SCROLL.ML when you save the program—Program 2 looks for a file with that name.

Program 2, written in BASIC, is a demo program that shows off the possibilities of Impossible Scroll. Type the program in and save it to the same disk that you used to save Program 1.

When you're ready to see the demo, load Program 2 and type RUN. You'll see a scrolling message below the normal limits of the screen.

COPYRIGHT 1987 COMPUTE! PUB., INC.
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INTRODUCING THE IMPOSSIBLE SCROLL
PROGRAM. JUST WATCH THE SCROLLING
MESSAGE AT THE BOTTOM. NOTE HOW IT
IS BELOW THE NORMAL DATA AREA, AWAY
FROM INTERFERING WITH A TEXT DISPLAY.
PRESS ANY KEY TO SEE MORE
F THE VIC-II CHIP...

Display fine-scrolling text across the bottom of the screen with this surprising technique. A demonstration program is included.

Sprites Only

Where do these phantom characters come from? There's no memory reserved for characters beyond the boundaries of the normal screen. The answer lies in the sprite capability of the 64. Sprites can exist on or off the active portion of the screen. Normally, when a sprite leaves the active area, it seems to pass below the border as it disappears—the border has a higher priority than the sprites. Actually, the VIC chip keeps track of the sprite even when it is hidden by the border. In fact, sprite collisions can happen outside the visible area of the screen.

There's only one question remaining. How can we turn off the border to see the sprites underneath? That trick involves the vertical fine-scrolling function of the VIC chip. With careful timing, we can confuse the chip. By setting the SCROLY register at location $D011 to 25-row mode and then switching to 24-row mode in the last line of text (by using a raster interrupt), the VIC chip never realizes that it should begin displaying the border. The top and bottom portions of the border disappear. (The left and right portions of the border remain, however.)

By modifying the demo program and using it in conjunction with your own routines, you can make the most of these special video effects.

[Ed. Note: Because this program takes the VIC-II chip beyond its design specifications, the display created by this program may differ from one computer to another.]

See program listings on page 86.

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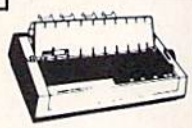

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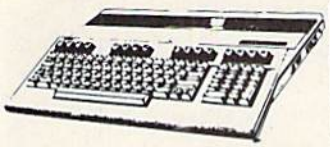

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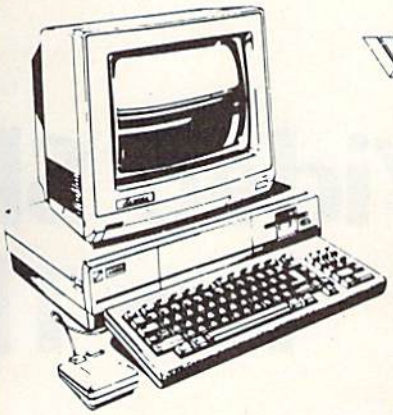

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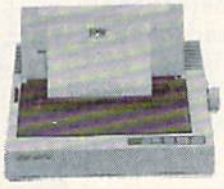

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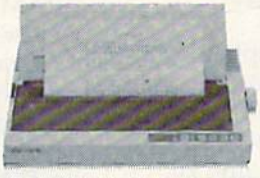

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Video Slide Show For The 128

Paul W. Carlson

Your graphics creations come to life with this versatile program that loads and instantly displays a sequence of your best hi-res and text artwork and your most impressive business graphics. Requires a disk drive.

Slide show programs are useful for computer-club demonstrations, teaching, business meetings, or just for showing off your artwork to relatives and friends. "Video Slide Show for the 128" allows you to display any number of hi-res, multicolor, or standard text screens in any order.

Typing It In

To get started, type in lines 10–380 and 1000–1020 from the program listing and save the resulting program to disk. The remaining lines (400–450) comprise an example set of DATA statements for a five-screen slide show.

When you're ready to make a custom slide show, load the program and add a DATA line for each picture that you wish to display. Follow the format of the example DATA statements. Each entry must begin with a letter code—*H* for hi-res, *M* for multicolor, or *S* for standard character mode. An *X* signifies the end of the slide show. The next item in each DATA statement is the name of the file containing the screen image. If the file is a multicolor graphics screen or a text screen, a file containing the color memory is also loaded. This file must have the same filename as the picture file, with the addition of a .CRAM extension. For example, a text file named TEXT1 must have a color memory file called TEXT1 .CRAM. The last two numbers in each DATA statement select the codes for the border and background colors that you wish to display with the screen. For your convenience, here is a list of color codes:

0	Black	8	Orange
1	White	9	Brown
2	Red	10	Light Red
3	Cyan	11	Dark Gray
4	Purple	12	Medium Gray
5	Green	13	Light Green
6	Blue	14	Light Blue
7	Yellow	15	Light Gray

I've included a sample subroutine at line 1000 for introducing the slide show. You can write your own if you like. If you'd rather just skip the introduction, delete line 20.

When you've finished entering the DATA lines for the screens you wish to display, save the program with a new name—you'll want to keep the first program for making later slide shows.

Saving For Display

Before you can have a slide show, you must have pictures to display. The 128's BSAVE command will come in handy.

To create a picture, you must begin with a program that draws something on the screen. Add lines to the program so that it saves the screen after the picture is displayed.

For high-resolution displays (GRAPHIC 1 mode), only the video matrix and bitmap need to be saved. Use this statement:

```
BSAVE "filename",P7168 TO P16192
```

For a multicolor display (GRAPHIC 3 mode), the video matrix and bitmap are saved in one file and the color RAM is saved in another file. Use these statements:

```
BSAVE "filename",P1024 TO P16192
POKE 1,PEEK(1)AND254
BSAVE"filename.CRAM",P55296 TO
  P56296
POKE 1,PEEK(1) OR 1
```

Be sure that the second filename differs from the first only in the .CRAM extension. For example, if you use PIC3 as the name of the file to contain the video matrix and bitmap, the name of the color RAM file should be PIC3.CRAM. The .CRAM file *should not* be listed in the DATA statements—the program will look for the file on its own. The first POKE statement causes the processor to use block 0 of color RAM when it executes the second BSAVE statement. (The processor normally uses block 1 of color RAM, even when the VIC chip is displaying data contained in block 0.) The second POKE statement cancels the first.

For standard character mode

(GRAPHIC 0, the default mode), use these statements:

```
BSAVE "filename",P1024 TO P2024
BSAVE "filename.CRAM",P55296 TO
  P56296
```

As for multicolor graphics mode, the second filename must be the same as the first, but with the extension .CRAM. No POKEs are needed because standard character mode uses block 1 of color RAM, the default.

To use Video Slide Show, load the program, make sure that all the files specified in the DATA statements are on the disk in the drive, and type RUN. The introductory screen will be displayed. After the drive light goes off, press any key to instantly display the first screen and load the next. Progress through the pictures by pressing any key.

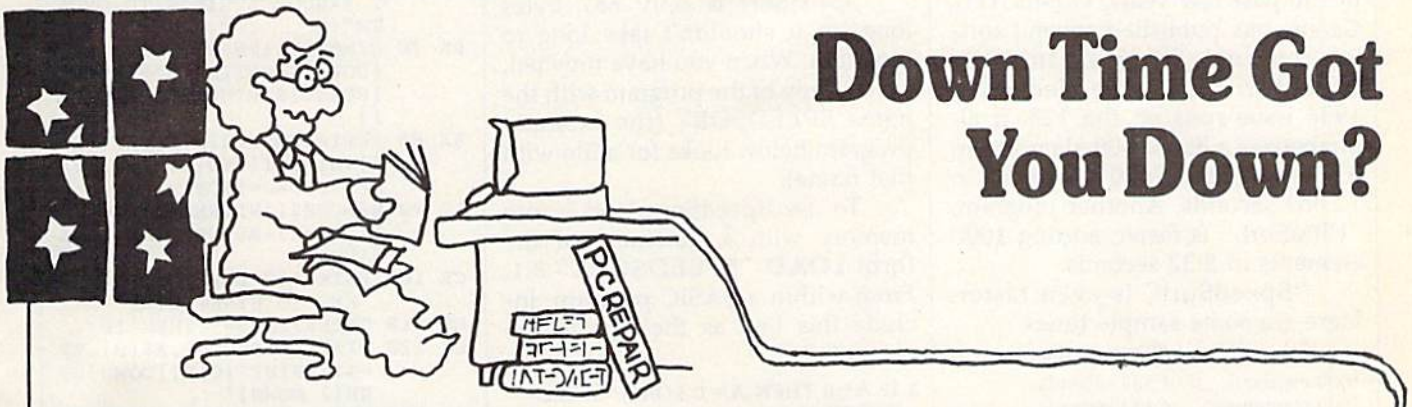
How It Works

The 128 has two 64K banks of RAM and two 1K blocks of color RAM. The VIC chip can be instructed to use either of the two 64K RAM banks and either of the two 1K blocks of color memory. The program loads the display data into bank 1 and block 1 while the VIC chip is looking at bank 0 and block 0. When a key is pressed, the VIC chip looks at bank 1 and block 1 while the display data is loaded into bank 0 and block 0, and so on.

You may wonder why the program contains so many PEEKs and POKEs. Why not use the GRAPHIC command to change modes? The reason is that the screen editor has to be disabled (the POKE 216,255 in line 70) so that the program can put display data in places other than where the editor expects to find it. With the screen editor disabled, the program needs to do all the setup work that the screen editor normally would do.

A substantial amount of the program does nothing but insure that the program terminates gracefully if an error is encountered. This is necessary because if the program terminates while the video is in anything but a default configuration, not even RUN/STOP–RESTORE will clear it up.

See program listing on page 78.



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SpeedSort

Kjell Strand

This program alphabetizes large string arrays in mere seconds. Written entirely in machine language, it's a valuable utility for BASIC programmers who need to sort lists quickly. For the 64.

In the past few years, COMPUTE!'s Gazette has published several sorting routines. The program "128 Quicksort" from the December 1986 issue runs on the 128. It alphabetizes a list of 100 elements in 0.833 seconds; 1000 elements in 12.083 seconds. Another program, "UltraSort," is faster, sorting 1000 elements in 8.32 seconds.

"SpeedSort" is even faster. Here are some sample times:

100 elements	0.15 seconds
1000 elements	1.883 seconds
2000 elements	4.133 seconds
3000 elements	6.583 seconds

SpeedSort was designed for a specific purpose and optimized for speed, so there are certain minor limitations you must remember. First, it works only on string arrays; you can't sort numeric arrays. Second, the string array must be one-dimensional (only one number in parentheses); you can't use it to sort multidimensional arrays. Finally, you can tell SpeedSort where to start sorting within the array, but you can't tell it where to stop sorting. It always sorts to the end of the array.

Using SpeedSort

Since SpeedSort is written in machine language, it must be entered with the "MLX" machine language entry program published elsewhere in this issue. When you run MLX, you'll be asked for a starting address and an ending address for the data you'll be entering. For SpeedSort, use the following values:

Starting address: C000
Ending address: C2AF

SpeedSort is only 687 bytes long, so it shouldn't take long to type it in. When you have finished, save a copy of the program with the name SPEEDSORT (the example program below looks for a file with that name).

To use SpeedSort, load it into memory with a statement of the form **LOAD "SPEEDSORT",8,1**. From within a BASIC program, include this line as the first in the program:

```
1 IF A=0 THEN A=1: LOAD "SPEEDSORT",8,1
```

Anytime you want to sort an array, you have to tell SpeedSort the name of the array and the starting point for the sort. If the array is called B$ and the first element to be sorted is number 1, you'd use **SYS 49152,B$(1)**. If you'd like to begin sorting at element 0, use **SYS 49152,B$(0)** instead. You may also start the sort at any other point within the array—the tenth string, for example—and you may sort any one-dimensional array currently in memory.

If you attempt to sort a numeric array such as A(1), you'll see a TYPE MISMATCH ERROR. If you include the name of a multidimensional array such as A$(0,0), it will return a SYNTAX ERROR.

To test SpeedSort, run this program:

```
FC 10 IFW=1THEN60
QF 20 REM COPYRIGHT 1987 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
AD 30 POKE53280,10:POKE53281,1
      0:PRINT"{CLR}{BLK}
      {3 SPACES}COPYRIGHT 1987
       COMPUTE! PUB., INC."
AA 40 PRINTTAB(10)"ALL RIGHTS
      {SPACE}RESERVED"
DB 50 W=1:LOAD"SPEEDSORT",8,1
JB 60 INPUT"{CLR}{DOWN}HOW MAN
      Y RANDOM STRINGS TO CREA
      TE";N
PK 70 DIMA$(N):PRINT"{CLR}
      {DOWN}CREATING"N"RANDOM
      {SPACE}STRINGS":A=RND(-T
      I)
AX 80 FORI=1TON:PRINTI;CHR$(14
      5):N1=INT(RND(1)*10+1):A
      $="":FORJ=1TON1
AD 90 B$=CHR$(INT(RND(1)*26+65
      )):A$=A$+B$:NEXT:A$(I)=A
      $:NEXT
CR 100 PRINT"{2 DOWN}PRESS ANY
       KEY TO START SORT"
PK 110 GETS$:IFS$=""THEN110
EK 120 T1=TI:SYS49152,A$(0):T2
      =TI:PRINT"{CLR}{DOWN}DO
      NE{2 DOWN}"
XC 130 MT$=STR$((T2-T1)/60):PR
      INT N"ELEMENTS SORTED I
      N"LEFT$(MT$,6)" SECONDS
      "
SC 140 PRINT"{2 DOWN}PRESS ANY
       KEY FOR SORTED LIST
      {DOWN}"
CC 150 GETS$:IFS$=""THEN150
CB 160 FORI=1TON:PRINTA$(I):NE
      XT
```

The example program builds an array of random strings of the size you specify. If you enter a large number, like 3000, be prepared for a long wait. Generating all those random strings takes much longer than sorting them.

For maximum speed, the example program turns off the screen with POKE 53265,0 and turns it back on with POKE 53265,27. A note of warning: If you use this technique in your own programs and an error occurs while the screen is blank, the error message will be invisible. If the screen blanks for too long, either press RUN/STOP-RESTORE or blindly type POKE 53265,27.

See program listing on page 83.

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Program Appender

Joseph R. Charnetski

This short utility—only nine lines—offers a quick and easy way to combine disk-based programs. For the Commodore 128, 64, Plus/4, and 16. A disk drive is required.

After you've been programming for a while, you probably find yourself writing programs that contain routines which are similar or identical to those you've written before. To avoid retyping even short routines, many programmers keep a disk-based library of frequently used routines; then, whenever these routines are needed, they're appended to the program being written.

Although there are several ways to combine programs, the technique common to each of these involves moving the start-of-BASIC address to two locations below the current end-of-BASIC address. Then, after a second program is loaded into memory, the pointers are reset to the original start-of-BASIC so the second program will be added—or appended—to the end of the first. The PEEK addresses required to determine the start- and end-of-BASIC as well as the POKE addresses to reposition the pointers are usually performed in direct mode by the programmer. If several programs must be combined, the repetitive PEEKs and POKEs can be tedious. There is an easier way.

Quick And Easy

"Program Appender," the short BASIC program accompanying this article, offers a quick and easy way of combining as many BASIC programs as you like. It works on the Commodore 128, 64, Plus/4, or 16 with a disk drive. Program Appender uses the technique described above; however, you need only enter the name of the program you wish to append—no PEEKs and no POKEs are required. The pointers are automatically manipulated from inside the program. The dynamic keyboard technique is used to load the program to be appended and to reset the pointers, which enables the programs to be combined.

To use the program, type it in using "The Automatic Proofreader," found elsewhere in this issue, and save a copy to disk. The program works as is on the 64. If you're using a 128, you need to substitute the following for the first line of the program:

```
1 BU=1319:BC=239:S1=43:S2=4
  4:A=PEEK(S1):B=PEEK(S2):C
  =PEEK(45):D=PEEK(46)
```

If you're using a Plus/4 or 16, substitute this line:

```
1 BU=842:BC=208:S1=45:S2=46
  :A=PEEK(S1):B=PEEK(S2):C=
  PEEK(4624):D=PEEK(4625)
```

After you've saved a copy to disk, load the program and type RUN. You're asked for the filename of the program you wish to append. Type it in and press RETURN. When the cursor reappears, the program has been appended to the program in memory.

It's important to note that the first line of each program to be appended should have a higher line number than the highest line number of the program in memory. You can run Program Appender again and again to combine many programs. When you finish using the program, you can delete it from memory by typing QUIT in response to the filename prompt. You can then save a copy of your combined programs on disk. Be sure to use a unique filename.

See program listing on page 83.

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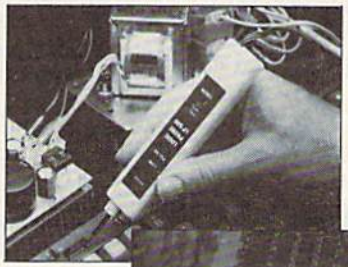

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DOS Plus

Michael J. Castor

This high-powered utility provides all the features of the DOS Wedge*—plus 16 additional functions, relocatability, and the ability to be customized so users can tailor it to their own specifications. For the 64 with a disk drive.*

"DOS Plus" duplicates the commands of the Commodore *DOS Wedge* with the addition of ten commands, five assigned function keys, and an escape key. DOS Plus allows the user to load any file to any location in random access memory (RAM), or to save from any location in RAM. It provides a simplified VERIFY command; a command which loads and runs a BASIC program; and decimal, hexadecimal (hex), and binary conversion. DOS Plus allows you to specify default colors for text, border, and background. Finally, the program is completely relocatable. Instructions are given below for the user who wants to customize the commands to suit his or her own taste. All of its commands can be executed from within a BASIC or machine language (ML) program. DOS Plus doesn't affect the speed of BASIC programs, and it uses the same amount of memory (1K) as the *DOS Wedge*.

Typing It In

Although DOS Plus is 1K (1023 bytes to be precise) of pure ML, the program listed is a 1.5K program called a relocator. When it is run, it moves DOS Plus into memory and activates it. To type in the program, you'll have to use "MLX," the machine language entry program found elsewhere in this issue. When you run MLX, answer the initial prompts as follows:

```
Starting address:  0801
Ending address:    0D30
```

After entering the DOS Plus relocator, be sure to save a copy to disk before running it. To run the DOS Plus relocator, just load it and run it as if it were a BASIC program. Instructions are given below for saving DOS Plus after it has been created by the relocator.

DOS Plus Commands

There are 19 commands recognized by DOS Plus (see Table 1). All commands require the *at* symbol (@) in the first space of a line, followed by the command letter or character. Some commands require additional parameters.

The *text* parameter is any string of characters. DOS Plus doesn't check the string for correct syntax, but simply uses it as given.

The *name* parameter represents the name of a file on disk. Any text found within quotation marks will be considered a filename. This allows you to use a directory listing. For example, the following line will load GAME into memory:

```
@/3     "GAME"          PRG
```

The 3 is a remnant from the directory listing which indicates file length in blocks; it is ignored, as is *PRG*. If no quotation marks are found, all text following the command is considered to be a filename. Thus the following example also loads GAME:

```
@/GAME
```

Note that leading spaces are considered part of the filename so that the following example would load " GAME" rather than "GAME":

```
@/ GAME
```

Note also that quotation marks take precedence over other text. Thus **@/GAME"** would result in a missing filename error, since DOS Plus tries to find a name following the quotation marks, but doesn't. One last note: Trailing quotation marks are not necessary except to exclude unwanted information like *PRG* or to include trailing spaces.

The *address*, *number*, and *value* parameters represent numeric values. DOS Plus accepts values in decimal, hexadecimal, and binary, so it recognizes 49152, $C000, or %1100000000000000 as the same value. Values must not have leading spaces. If, however, another parameter is to follow a value, one space must separate the two. If DOS Plus doesn't understand a value, an ILLEGAL QUANTITY ERROR message is returned.

DOS Plus Commands

The following is a detailed description of all DOS Plus commands. Also refer to Table 1.

@

Reads the disk error channel and displays it.

@*text*

Sends the string *text* to the drive command channel. For example, to rename a file you might use @R0:NEW=0:OLD.

@$*text*

Lists the directory of the disk on the screen. Pressing the space bar will freeze the display, after which pressing any key will continue the listing. Pressing RUN/STOP will end the display. The *text* parameter is an optional string of characters defining a limited directory listing.

Examples:

```
@$
@$:?DOS
@$:*=P
```

@/*name*

Loads a BASIC program. When this is done, the end-of-load address is displayed. This is the address, plus one, of the last byte loaded.

@↑*name*
Loads a BASIC program and then runs it.

@←*name*
Saves to disk the BASIC program in memory. When this is done, the disk error channel is read and displayed.

@?*name*
Compares the BASIC program in memory to the file on disk named *name*. When this is done, the ending address of the disk file is displayed. If this value isn't the same as the ending address of the program in memory, a ?VERIFY ERROR message is printed.

@%*name*
Loads a program file into memory at the address from which it was saved, after which the ending address of the load is displayed.

@!*address1 address2 name*
Saves the contents of memory from *address1* to *address2* minus one. The error channel is then read. For example,

```
@!$CC00 $CFFF .DOS
```

would save DOS Plus to disk with .DOS as the filename. Note that the last byte saved would be the one at $CFFE, not $CFFF.

@:*name*
Compares a disk file with memory, starting at the file's load address. The ending address of the disk file is displayed, followed by ?VERIFY ERROR if the data read from disk doesn't match the contents of the corresponding area of memory.

@address name***
Loads a file into memory starting at the specified address. After the file is loaded, its ending address is displayed.

@;*address name*
Compares a file with memory, starting at the specified address. The ending address of the file is displayed, followed by a ?VERIFY ERROR message if the data read from disk doesn't match the contents of the specified area of memory.

@S*name*
Deletes from the disk the file named *name*. This command doesn't actually exist in the *DOS Wedge*, which requires that you send a scratch command to the disk drive's command channel. Thus, the only way to scratch a file with the *DOS Wedge* is to enter S0:*name*. Instead, DOS Plus locates the filename, adds S0: to the front of it and sends it to the drive's command channel. This enables you to use a directory listing to scratch files. For example, the following will delete GAME from the disk:

```
@S      "GAME"          PRG
```

However, S0:GAME will try to scratch the file 0:GAME because DOS Plus actually sends the command S0:0:GAME to the drive.

@£*name*
Displays the load address of a file. This is the address at which the file will start loading if you LOAD "*name*",8,1 or @%*name*. This command is especially useful when you can't remember a machine language program's SYS address (most ML programs start at their load addresses) or when you are using DOS Plus to copy non-BASIC program files as described below.

@#*number*
Sets the DOS Plus device number (normally 8) to *number*. The device number determines which drive DOS Plus will access. The most common number for a second disk drive is 9.

@Q
Deactivates DOS Plus commands and functions.

@F
Turns on the IRQ-driven functions which are deactivated by RUN/STOP–RESTORE. It also automatically displays the default colors. (See f1 below.)

@X
Disables the IRQ-driven functions.

@=*value*
Converts a hexadecimal value (with the symbol $ as a prefix) to a decimal value (with no prefix), a decimal value to hexadecimal, or a binary value (with the symbol % as a prefix) to the default numeric type (see below). For example, @=$CC00 will return 52224.

DOS Plus Functions

When the IRQ functions are activated, as they are when DOS Plus is first RUN, six keys perform special functions. These are five color keys and an escape key.

Escape Key. When in quote or insert mode in the 64's screen editor, you can easily escape by holding down the CTRL key and pressing the ← key. Both insert and quote modes are then canceled.

Color Keys. Five function keys (f1, f2, f3, f5, and f7) are given functions to ease the changing of colors on the 64. The selected colors are those display colors (text, background, and border) which you prefer. Their default values are, respectively, white, black, and dark gray.

- **f1** Displays the default colors.
- **f2** Makes the colors currently on the screen the new default colors.
- **f3** Changes the text color. (All 1000 color-memory nybbles are set to this color.)
- **f5** Changes the background color.
- **f7** Changes the border color.

Using DOS Plus In A Program

DOS Plus is primarily an immediate-mode utility, to be used outside of program mode. It can, however, be used while a program is running, either from the keyboard or from the program itself.

Most BASIC and many ML programs will leave the IRQ vector unchanged when they are run, thereby allowing you to use DOS Plus's escape key and color keys. Occasionally this could cause problems. If you experience difficulty, use the @X or @Q commands to deactivate them.

To use a function key under program control, the following subroutine can be used:

```
10 POKE 631,ASC("key"):POKE 198,
1:I=TI
20 IF I=TI GOTO 20
30 POKE 198,0:RETURN
```

Insert any function-key symbol between the quotation marks in line 10. The program simply pokes the key into the keyboard buffer and then waits for an IRQ to perform the function. It then removes the key from the buffer.

Using DOS Plus commands from a BASIC program is also quite easy. Simply POKE the text of the command into the INPUT BUFFER and then call DOS Plus to execute it. The following program illustrates this by requesting a DOS command and then executing it.

```
10 DC$="":INPUT"DOS
   COMMAND";DC$
20 IF DC$="" THEN END
30 FOR L=1 TO LEN(DC$)
40 POKE 511+L,ASC(MID$(DC$,L,1))
50 NEXT:POKE 511+L,0
60 SYS 52224+3:GOTO 10
```

As written, the program requires that a character precede the actual command. That character, normally @, is POKEd into 512, but is not checked by DOS Plus. A zero byte must follow the command. The address for the SYS is the base address of DOS Plus, wherever it is located, plus 3.

Moving DOS Plus Around

The *DOS Wedge*, like nearly all machine language programs, is made to exist in one, and only one, area of memory. Attempting to run it after loading it anywhere other than $CC00 will cause it to crash. DOS Plus, however, is moved into memory by the relocater program, which alters it to exist at any memory address.

Relocating DOS Plus is easy. First, load the relocater program. Do not run it. Instead, list it. The following will appear on the screen:

```
52224 SYS2132
```

The line number is the address where DOS Plus will be located. Changing the line number changes the address. It's that simple.

If you don't care to resave the relocater, you may type NEW and then reenter the line. If you wish to resave the relocater, enter the current line number alone and press RETURN. Then reenter the line with a new line number. Finally, save the relocater under a different name.

Customizing DOS Plus

If you prefer different commands, colors, or keys, DOS Plus can easily be customized to suit your tastes. The relocater program can be changed in three ways: by changing the location of DOS Plus in memory, by setting the device number and the selected colors, and by changing the command codes themselves.

Within the relocater program is a table which holds values used by DOS Plus. The addresses and default values are shown in Table 2. By changing these values with POKEs and then saving this modified relocater you can make your own version of DOS Plus. Some words of caution are in order, however. First, you should not change any of the values in the table to zero. Zero is used as a special-purpose flag by the relocater. Second, be certain you're POKEing in the right place. Finally, be sure to use a backup of the relocater, just in case.

The first byte in the table determines if numeric values such as load addresses, ending addresses, and binary conversions will be displayed in decimal or hex. A value greater than 127 will select hex.

The second byte holds the default device number, changed temporarily by the @# command. This value will usually be 8 or 9.

The next three bytes hold the default colors, changed temporarily by f2. POKE these locations with values 1–15. Since you can't use zero, use 128 for black.

The last 19 bytes hold the codes for the command character, the escape key, and each DOS Plus command. By changing these val-

Table 1: DOS Plus Commands And Functions

Command	Function
@	Read error channel *
@*text*	Send command *
@$*text*	Display directory *
@/*name*	Load BASIC program *
@↑*name*	Run BASIC program *
@←*name*	Save BASIC program *
@?*name*	Verify BASIC program
@%*name*	Load ML program *
@!*address1 address2 name*	Save ML program
@:*name*	Verify ML program
@**address name*	Load at address
@;*address name*	Verify at address
@S*name*	Scratch file
@£*name*	Display load address
@#*number*	Set device number *
@Q	Quit (exit) DOS Plus*
@F	Turn on IRQ functions
@X	Turn off IRQ functions
@=*value*	Perform value conversion
f1	Display default colors
f2	Set default colors
f3	Increment text color
f5	Increment screen color
f7	Increment border color
CTRL-←	Escape key

(*) indicates *DOS Wedge* command.

Table 2: DOS Plus Memory Map

Location	Value	Default	Description
2230	128	Hex	Numeric output type
2231	8	8	Device number
2232	1	White	Text color
2233	128	Black	Screen color
2234	11	Dark Gray	Border color
2235	64	@	Command character
2236	6	CTRL-←	Escape-key character
2237	36	$	Directory (can't change)
2238	47	/	Load BASIC program
2239	37	%	Load ML program
2240	94	↑	Run BASIC program
2241	42	*	Load at address
2242	63	?	Verify BASIC program
2243	83	S	Scratch
2244	81	Q	Quit
2245	58	:	Verify ML program
2246	59	;	Verify at address
2247	95	←	Save BASIC program
2248	33	!	Save ML program
2249	70	F	Turn on IRQ functions
2250	35	#	Set device number
2251	61	=	Numeric conversion
2252	92	£	Display load address
2253	88	X	Turn off IRQ functions

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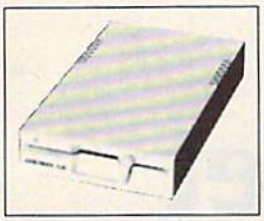

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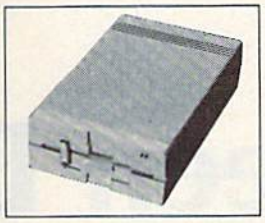

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ues, you can modify the program to use @L instead of @/, or >$ instead of @$. The values POKEd here must be Commodore ASCII codes for the desired characters. You can look up the values in charts in the *Commodore 64 User's Guide* or you can type:

```
PRINT ASC("character")
```

where *character* is the character whose ASCII code you want to POKE. You must take care that the code you POKE isn't one recognized by the disk command channel. If it is, DOS Plus prevents you from sending that disk command because it believes that you are giving it a DOS Plus command.

Table 2 is a complete memory map of the locations you can change in the DOS Plus relocater program. Note that $ cannot be changed since the $ is part of the filename sent to the drive to load a directory.

Copying With DOS Plus

Using DOS Plus to copy non-BASIC program files is easy. To copy a file named PROG which resides in memory from $CC00 to $CFFE, do the following: Find the load address of PROG using the command

```
@£PROG
```

DOS Plus responds with the number $CC00. Load the file using the command

```
@%PROG
```

DOS gives an ending address of $CFFF. Save a new copy of the file using the command

```
@!$CC00 $CFFF PROG1
```

Note that the ending address is used to set the end of the SAVE. In practice, the names and values will differ, but the procedure won't. Note that files which load under ROM cannot be copied using DOS Plus.

Technical Information

DOS Plus is designed to work with most BASIC extensions, utilities, and BASIC and ML programs. The following information will help you determine compatibility.

DOS Plus changes two vectors when it is activated. The tokenization vector ICRNCH at $0304 and the IRQ vector CINV at $0314 are altered so that they point to the equivalent DOS Plus routines.

The original value found in ICRNCH is saved by DOS Plus so that control is passed to the previous ICRNCH routine if a line does not start with @. This allows DOS Plus to work with BASIC extensions which alter ICRNCH, provided that DOS Plus is activated *after* the BASIC extension.

The CINV vector is not saved by DOS Plus. Instead DOS Plus calls the standard IRQ routine. Any utilities that alter this vector must, therefore, be activated after DOS Plus.

DOS Plus uses very few memory locations. Those that are used are various Kernal variables and the following locations: $07, $08, $0A, and $14–$15. DOS Plus uses them in the same way BASIC uses them so there is little chance of interference.

See program listing on page 85.

Screen Dump Set For The 128

John Huggins

Although these programs for the 128 are short, they do a lot. You can print out a hi-res screen, two screens side-by-side, portions of a screen, or sprite shapes. Requires a seven-pin Commodore printer (1525, MPS-801, or MPS-803; or either MPS-1000 or MPS-1200 in Commodore mode).

One of the 128's strengths is its plethora of powerful graphics commands such as CIRCLE, BOX, DRAW, and others. They make it easy to create detailed high-resolution artwork. But there's no easy way to print out the finished screen. Other computers have a built-in command (or key on the keyboard) to dump the screen to the printer. Not the 128. You can draw shapes and pictures on the screen, but you can't transfer them to paper.

A few short programs solve this problem. The first, "128 Screen Dump," prints out a hi-res screen. "128 Dual Dump" prints two pictures next to each other. "Window Dump" allows you to set the upper left and lower right corners of the region to be printed, and then it prints out just that portion of the screen. The fourth program, "Sprite Dump" prints the current patterns of the eight sprites.

Typing Instructions

All five programs are written in BASIC 7.0. Program 1 creates a machine language program called SCREENDUMP.ML on disk. In order to run, the other four programs require this SCREENDUMP.ML file. Programs 2–5 perform the screen dumps.

After typing in and saving Program 1, run it. Type DIRECTORY (or press the f3 key) to make sure that a program file called SCREENDUMP.ML has been created. You may now use any of the screen dump programs. Note that you should type and run all of the programs from 128 mode, and that Programs 2–5 must be stored on the same disk as the SCREENDUMP.ML file.

Program 2, 128 Screen Dump, begins by asking for a filename. Specify the name of a hi-res graphics screen image that you have BSAVEd with a starting location of $1C00 (decimal 7168) or $2000 (8192). The screen loads into the hi-res area, and the hi-res screen dump is sent to the printer.

If you fail to provide a filename, the current contents of hi-res screen memory are printed instead. Screens created in GRAPHIC 1 (hi-res) mode look the best, although GRAPHIC 3 (multicolor hi-res) screens will be acceptable. It's important to remember that the foreground color will appear in black ink. If you draw a white circle on a black background, the printout will seem to be reversed, because white is the foreground color on the screen.

Program 3, Dual Dump, is similar to Program 1, but it prints two screens side-by-side. First you're asked for the two filenames for the hi-res pictures. Unlike the first program, Dual Dump does not allow you to use a screen in memory; both graphics files should reside on disk. The next prompt asks if you want the screens to touch each other or to have a space between them. Respond by pressing T or S. The program proceeds to BLOAD and print out both screens.

Program 4, Window Dump, also requests a filename. If you type nothing and press RETURN, the program assumes you wish to print the picture currently in memory. Before the screen dump begins, you must mark the corners of the portion you want to print. Press (or hold down) the keys on the numeric keypad to move the sprite pointers around the screen. The 5 key is neutral. Each of the eight surrounding keys represents one of the points of the compass. Pick the upper left corner, press ENTER to set the position, then pick the lower right corner and press ENTER again

to set that position. The portion of the screen within the specified boundaries is then printed out. Occasionally, you'll discover that the sprite pointers have been changed, especially if you load both the color and bitmap memory from a screen drawn on the 64. If the sprite shapes seem to turn to garbage, add **POKE 8184,56: POKE 8185,57** just after the BLOAD in line 180.

The final program, Sprite Dump, prints out copies of the pattern definitions for all eight sprites. As with the other programs, pressing RETURN at the filename prompt will cause the program to work with the shapes currently in memory. The sprites should be stored in the default locations, 3584–4096. Use this program with caution; it destroys any high-resolution screen currently in memory.

Although these programs are written as stand-alone applications, it should be a simple matter to convert them to subroutines you can add to your own programs.

How It Works

The greatest stumbling block in writing high-resolution screen dump routines is the way screens are stored in memory. The 8000-byte bitmap is arranged as 25 groups of 320 bytes. Each line of 320 bytes is further divided into 40 groups of 8. The 8 bytes (64 bits) correspond to an 8 × 8 pixel area which occupies the same space as a text-screen character.

Most Commodore printers, however, have only seven pins in their printheads. Collecting the right number of bits from the screen becomes quite a chore.

The 128's SSHAPE command eliminates this problem. SSHAPE saves a rectangular shape from the hi-res screen into a string. If you examine the contents of the string with ASC and MID$, you'll see that the characters are just a copy of the screen image plus four trailing descriptive bytes. So, to create a hi-res screen dump for the 128, start at the right edge and just SSHAPE seven columns of pixels. The ML routine divides the byte values by two and adds 128 (because the printer expects characters in the range 128–255).

See program listings on page 88.

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80-Column Magic For The 128

Mark W. Pemburn

Add several useful features and special effects to your 80-column BASIC programs with this powerful machine language program. A demonstration program is included to show you how to use the routines in your own programs. A disk drive is required.

The 80-column display of the 128 is a new frontier for Commodore owners. Machine language programmers are beginning to do truly amazing things with the VDC (Video Display Controller) chip, which controls the 80-column display. "80-Column Magic For The 128" lets BASIC programmers share some of the power that's available. We'll be going well beyond what's possible in BASIC 7.0.

Multiple windows that can disappear without a trace, screen flipping, and more are possible with 80-Column Magic. First, type in Program 1. Since this is a machine language program, type it in using the 128 version of "MLX," the machine language entry program found elsewhere in this issue. When MLX asks for starting and ending addresses, respond with the following values:

Starting address: 0B00
Ending address: 0C87

When you've finished typing in the program, be sure to save a copy to disk with the name MAGIC. (Program 2 looks for a file of this name.)

Easy Access

Part of the machine language program allows for easy access to the VDC chip via the SYS command. On the 128, SYS allows for parameters to be passed directly to machine language programs. The syntax of the command which allows you to write to the VDC is:

SYS 3163,*VDC register number,value*

The VDC has 37 registers numbered from 0 to 36, but we'll be using only a few of the registers here. (For more information on the usage of all the VDC registers, refer to *Mapping The Commodore 128* from COMPUTE! Books.)

Swapping Screens

The VDC chip has its own 16K of memory that cannot be accessed by the rest of the system, so you cannot use PEEK and POKE to directly view or alter this video RAM. The RAM is organized like this:

$0000–$07FF	Screen memory
$0800–$0FFF	Attribute memory
$1000–$1FFF	Free space
$2000–$3FFF	Character definitions

Let's see what's possible. Boot your 128 in 80-column mode, then BLOAD MAGIC. Now, type in the following BASIC program lines:

```
10 SYS 3163,18,0
20 SYS 3163,19,0
30 SYS 3163,31,3
```

Run the program in 80-column mode. You'll see the letter C (which has a screen code of 3) in the upper left corner of the screen.

Register 31 gets the value we wish to place into video RAM and writes it to the address pointed to in registers 18 and 19. (Register 18 holds the high byte of the address, and register 19 holds the low byte.)

With the C still on the screen, change line 10 to read SYS 3163, 18,8 and run the program again. You are now changing attribute memory. The C turns blue (color 3). Change the 3 to a 19 to get an uppercase blinking blue letter. Try values from 0 to 255 to see all the variations.

In addition to the WRITE command, Program 1 also supports a READ command. Try this:

```
10 SYS 3151,,30
20 RREG A:PRINT A
```

These lines print the contents of VDC register 30.

Unfortunately, it would take a long time to do anything useful from BASIC with these two routines. For this reason, my machine language program also contains

routines to move whole blocks of memory at machine language speed.

Program 2 is a BASIC program which demonstrates the power of 80-Column Magic. Type it in and save it to the disk which contains Program 1. Then, load and run it (it loads Program 1 into memory). Lines 710, 730, 790, and 810 contain four SYS calls that move large blocks of memory. The first two move screens within the address space of the VDC, while the others move memory from the VDC to the 128's RAM or vice versa. Let's take a close look at each one of these calls.

SYS 2816,0,16. This copies the entire 80-column screen (including attribute memory) into the 4K free space in the VDC's video memory.

SYS 2816,16,0. This is the same operation in reverse—it copies a screen from the free space area into the screen and attribute memory of the VDC.

SYS 2970,0,address high byte. This call moves the screen from the VDC's video memory to the 128's BANK 1 memory. For the high byte of the address, use a number no lower than 6 and no higher than 239. Be sure to use increments of 16 for the various screen storage areas so the screens don't overwrite each other. For example, if you wanted to buffer three screens, you could use 6, 22, and 38 as the high byte of the address. Use *SYS 2970,16,-address high byte* to move the free video memory ($1000–$1FFF) instead of the screen memory ($0000–$0FFF).

SYS 3062,16,address high byte. This call moves a screen from the 128's BANK 1 memory to the free area of VDC video memory. If you've saved a screen with SYS 2970, you can move it into free memory with this SYS, and then you can quickly move it into the screen memory with a SYS 2816,16,0.

Fast Change

Two other SYS commands are used in the demo. They are used to instantly change all occurrences of an attribute or character to a different attribute or character. For instance, you could turn all blue characters into flashing yellow characters.

Before using the SYS commands that perform these tasks, you must POKE the code of the existing attribute or character into location 253 and the code of the replacement attribute or character into location 254. Typing SYS 2890,8,16 will change all those attributes in VDC screen memory that match the value in 128 memory location 253; it changes them to the value in location 254. SYS 2890,24,32 changes the attributes of a screen stored in the free video RAM. To change all occurrences of one character to another character, SYS 2890,0,8 or SYS 2890,16,24 for the screen in free video memory.

See program listings on page 84.

bug-swatter

Modifications and Corrections

• In "Fraction Practice" (June), no matter how you answer the "DO YOU NEED INSTRUCTIONS (Y/N)?" prompt, the program will display the instructions for how to play the game. Simply add the following line to correct the problem:

```
RF  55 IF LEFT$(I$,1)<>"Y"THEN
       {SPACE}180
```

• The cards printed by "Bingo" (June) are apparently too small for some of our readers, one of whom has suggested the following modification for creating larger cards:

```
DQ 1110 DV=4:TB$="{17 SPACES}"
        :PRINTCHR$(147):PRINT:
        TB=12:S$="{4 SPACES}"
BF 1115 E$=CHR$(14):F$=CHR$(15
        ):GOTO 1150:REM DOUBLE
         WIDE, NORMAL TEXT
MC 1120 DV=3:TB=7:PRINTCHR$(14
        7);CP$:PRINT:PRINT:PRI
        NT:S$="{4 SPACES}":E$=
        "":F$=E$:TB$=E$
RQ 1300 IFDV=4THENPRINT#4,LEFT
        $(TB$,17)E$"B"S$"I"S$"
        N"S$"G"S$"O"F$:PRINT#4
DD 1305 IFDV=3THENPRINT#4,"
        {2 SPACES}B";S$;"I";S$
        ;"N";S$;"G";S$;"O"
KH 1320 PRINT#4,LEFT$(TB$,TB);
        E$;C$;F$
FK 1330 PRINT#4,LEFT$(TB$,TB);
        E$;D$;F$
SF 1335 IFDV=4THENPRINT#4,LEFT
        $(TB$,TB);E$;D$;F$
AQ 1340 PRINT#4,LEFT$(TB$,TB);
        E$;
ES 1400 PRINT#4,"*";F$
BS 1410 PRINT#4,LEFT$(TB$,TB);
        E$;D$;F$
CB 1415 IFDV=4THENPRINT#4,LEFT
        $(TB$,TB);E$;D$;F$
MC 1420 NEXT I
RS 1430 PRINT#4,LEFT$(TB$,TB);
        E$;C$;F$
```

Lines 1230 and 1240 also need to be deleted.

• Several readers have requested information on how to use "SpeedScript Date and Time Stamper" and "Preview-80" together since each of these programs has its own loader to boot *SpeedScript*. Unfortunately, these two *SpeedScript* utilities occupy the same area of memory and cannot be used concurrently.

• The program listings for "Power BASIC: Text Framer" (July) are labeled incorrectly. The listing labeled *128 Version* is actually the 64 version, and vice versa.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," elsewhere in this issue.

Video Slide Show For The 128

Article on page 64.

```
MG 10 POKE48,64:CLR:TRAP360
QF 20 REM COPYRIGHT 1987 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
FC 30 PRINT"{CLR}{2 SPACES}COP
      YRIGHT 1987 COMPUTE! PUB
      ., INC."
HH 40 PRINTTAB(11)"ALL RIGHTS
      {SPACE}RESERVED":SLEEP 3
FR 50 GRAPHIC1,1:GRAPHIC0,1
KH 60 GOSUB1000
JQ 70 POKE216,255:POKE56576,PE
      EK(56576)OR3
GM 80 GOSUB210:IFT$="X"THEN190
BX 90 BLOAD(F$),B1:B=1
EB 100 IFT$<>"H"THENPOKE1,PEEK
      (1)OR1:F$=F$+".CRAM":BL
      OAD(F$)
PH 110 GETKEYA$
BJ 120 GOSUB270
CX 130 GOSUB210:IFT$="X"THEN19
      0
KM 140 BLOAD(F$):B=0
KD 150 IFT$<>"H"THENPOKE1,PEEK
      (1)AND254:F$=F$+".CRAM"
      :BLOAD(F$)
HP 160 GETKEYA$
RR 170 GOSUB270
BB 180 GOTO80
CD 190 POKE216,0:POKE217,0:POK
      E1,115
PB 200 POKE54534,4:COLOR0,12:C
      OLOR1,14:COLOR4,14:GRAP
      HIC0,1:END
CD 210 READT$:IFT$="X"THENGETK
      EYA$:RETURN
BR 220 IFT$="M"ORT$="H"ORT$="S
      "THENREADF$,BR,BK:RETUR
      N
CC 230 POKE54534,4:POKE216,0:P
      OKE217,0
QM 240 GRAPHIC0,1:PRINTCHR$(14
      7);"FILE TYPE NOT H, M,
       OR S"
KJ 250 PRINT"PRESS ANY KEY TO
      {SPACE}EXIT PROGRAM..."
      :GETKEYA$
EA 260 T$="X":RETURN
DB 270 IFB=0THENPOKE1,PEEK(1)A
      ND253:ELSEPOKE1,PEEK(1)
      OR2
JF 280 IFT$="S"THEN330
JP 290 POKE53265,PEEK(53265)OR
      32
GA 300 IFT$="M"THENPOKE53270,P
      EEK(53270)OR16
RB 310 IFT$="H"THENPOKE53270,P
      EEK(53270)AND239
MJ 320 POKE53272,120:POKE1,PEE
      K(1)OR4:GOTO350
PB 330 POKE53265,PEEK(53265)AN
      D223:POKE53270,PEEK(532
      70)AND239
MK 340 POKE53272,20:POKE1,PEEK
      (1)AND251
RG 350 POKE54534,4+64*B:POKE53
      280,BR:POKE53281,BK:RET
      URN
KG 360 POKE54534,4:POKE216,0:P
      OKE217,0:POKE1,115:COLO
      R0,12:COLOR1,14:COLOR4,
      14
AG 370 GRAPHIC0,1:IFDS=62THENP
      RINT"FILE ";CHR$(34);F$
      ;CHR$(34);" NOT FOUND":
      END
FS 380 PRINTERR$(ER):END
RK 400 DATA H,PIC1,2,0
CQ 410 DATA M,PIC2,0,0
SD 420 DATA M,PIC3,1,1
HG 430 DATA S,PIC4,0,0
XM 440 DATA H,PIC5,9,0
XQ 450 DATA X
ME 1000 CHAR1,10,12,"LOADING F
        IRST SCREEN"
PA 1010 CHAR1,10,18,"PRESS ANY
         KEY AFTER"
CB 1020 CHAR1,8,20,"THE DRIVE
        {SPACE}LIGHT GOES OFF"
        :RETURN
```

Exercise Pacer

Article on page 33.

```
BE 10 REM COPYRIGHT 1987 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
KS 20 POKE53280,11:POKE53281,0
PM 30 PRINTCHR$(142)CHR$(8)"
      {CLR}{YEL}{DOWN}
      {3 SPACES}COPYRIGHT 1987
       COMPUTE! PUB., INC."
PQ 40 PRINTTAB(10)"ALL RIGHTS
      {SPACE}RESERVED":PRINT"
      {DOWN}READING DATA..."
QR 50 FORI=1TO332:READA:X=X+A:
      NEXT:IFX<>42309THENPRINT
      "DATA STATEMENT ERROR.":
      STOP
HF 60 DIMX(201),NA$(201),TL$(2
      01):OPEN15,8,15:V=53248:
      RESTORE
CB 70 POKE54296,15:POKE54272,1
      32:POKE54273,225:POKE542
      77,0:POKE54278,240
CH 80 POKE54279,134:POKE54280,
      33:POKE54284,15:POKE5428
      5,250
SD 90 POKE54286,106:POKE54287,
      110:POKE54291,30:POKE542
      92,0
AJ 100 FORS=832TO894:READD1:PO
       KES,D1:NEXT:FORS=896TO9
       58:READD2:POKES,D2:NEXT
XK 110 POKE2040,13:POKE2041,14
       :POKEV+29,3:POKEV+23,3:
       POKEV+39,4:POKEV+40,4
FC 120 POKEV+16,3:POKEV+0,20:P
       OKEV+2,20:POKEV+1,138:P
       OKEV+3,138
QC 130 FORM=49152TO49357:READD
       3:POKEM,D3:NEXT
HF 140 INPUT"{CLR}ENTER TIME O
       F DAY (HHMM)";A$:IFVAL(
       A$)>1259ORLEN(A$)<4THEN
       140
XA 150 H1=VAL(LEFT$(A$,1)):H2=
       VAL(MID$(A$,2,1))
FD 160 M1=VAL(MID$(A$,3,1)):M2
       =VAL(RIGHT$(A$,1))
KA 170 PRINT"{DOWN}"LEFT$(A$,2
       )":"RIGHT$(A$,2)
RG 180 PRINT"{DOWN}IS THIS OK
       {SPACE}(Y/N)?"
FE 190 GETD$:IFD$=""ORD$<>"N"A
       NDD$<>"Y"THEN190
JF 200 IFD$="N"THEN140
MQ 210 POKE56331,(H1*16)+H2:PO
       KE56330,(M1*16)+M2:POKE
       56329,0:POKE56328,0
XE 220 IFFL=1THEN1320
KE 230 POKE650,128:GOSUB240:GO
       TO310
QA 240 LN$(1)="***************
       ************************
       "
RB 250 LN$(2)="{4 SPACES}{YEL}
       {6 @}":LN$(3)="
       {4 SPACES}{6 T}"
CQ 260 PRINT"{CLR}{3}{R}"LN$(1
       )"{R}";
PA 270 PRINT"{3}-{12 SPACES}
       {8}EXERCISE PACER{3}
       {12 SPACES}-";
XK 280 PRINT"{3}{E}"LN$(1)"{E}
       ";:RETURN
XE 290 PRINTLN$(2):PRINT"
       {3 SPACES}{M}{N}{4 @}{N}{G}
       ":RETURN
FH 300 PRINT"{3 SPACES}{M}N
       {4 T}M{H}":PRINTLN$(3):
       RETURN
BC 310 GOSUB290:PRINT"
       {3 SPACES}{2 M} F1 {G}
       {H}{4 SPACES}ENTER EXER
       CISES/SAVE":GOSUB300
RM 320 GOSUB290:PRINT"
       {3 SPACES}{2 M} F3 {G}
       {H}{4 SPACES}RECALL PRO
       GRAM/EDIT/RUN":GOSUB300
MQ 330 GOSUB290:PRINT"
       {3 SPACES}{2 M} F5 {G}
       {H}{4 SPACES}FORMAT DIS
       KETTE":GOSUB300
FG 340 GOSUB290:PRINT"
       {3 SPACES}{2 M} F7 {G}
       {H}{4 SPACES}EXIT EXERC
       ISE PACER":GOSUB300:GOS
       UB1710
PH 350 GETD$:IFD$=""THEN350
AD 360 D=ASC(D$)-132:IFD<1ORD>
       4THEN350
GR 370 ONDGOTO530,890,380,480
FD 380 PRINT"{CLR}{WHT}
       {2 DOWN}YOU HAVE CHOSEN
        TO FORMAT A DATA"
RX 390 PRINT"DISKETTE. ARE YOU
        SURE YOU WANT TO
       {6 SPACES}DO THIS (Y/N)
       ?":GOSUB1710
AC 400 GETD$:IFD$=""ORD$<>"Y"A
       NDD$<>"N"THEN400
RB 410 IFD$="N"THEN220
SM 420 PRINT"{CLR}{2 DOWN}
       {WHT}INSERT YOUR DISK I
       NTO THE DISK DRIVE."
SG 430 PRINT"{DOWN}PRESS ← TO
       {SPACE}START FORMATTING
       .":GOSUB1710
GC 440 GETD$:IFD$<>"←"THEN440
DK 450 PRINT#15,"N0:EXERCISE D
       ATA,01"
GG 460 PRINT"{CLR}{2 DOWN}
       {CYN}{RVS}...FORMATTING
        DISKETTE"
QG 470 GOSUB1660:GOTO220
HS 480 PRINT"{CLR}{2 DOWN}
       {WHT}YOU HAVE CHOSEN TO
        EXIT THE PROGRAM."
EB 490 PRINT"ARE YOU SURE YOU
       {SPACE}WANT TO DO THIS
       {SPACE}(Y/N)?":GOSUB171
       0
QM 500 GETD$:IFD$=""ORD$<>"Y"A
       NDD$<>"N"THEN500
```

```
AP 510 IFD$="N"THEN220
QG 520 CLOSE15:PRINT"{CLR}":EN
       D
HC 530 NA$="":PRINT"{CLR}
       {2 DOWN}{WHT}NAME OF EX
       ERCISE PROGRAM:":INPUTN
       A$:IFNA$=""THEN220
AH 540 IFLEN(NA$)>12THEN530
DC 550 PRINT"{CLR}":NU=1
BQ 560 IFNU=200THEN660
XA 570 PRINT"{DOWN}{WHT}EVENT
       {SPACE}#"NU"NAME (ENTER
        {RVS}END{OFF} TO STOP)
       :":INPUTNA$(NU)
EB 580 IFLEN(NA$(NU))>35THEN57
       0
DD 590 IFNA$(NU)="END"THENNA$(
       NU)="":X=NU-1:GOTO660
BA 600 PRINT"{DOWN}{YEL}TIME L
       IMIT FOR EVENT #"NU"(MM
       SS):":INPUTTL$(NU)
RQ 610 IFLEN(TL$(NU))>4THEN600
ER 620 PRINT"{DOWN}{7}{RVS}ANY
        MISTAKES (Y/N)?":GOSUB
       1710
XH 630 GETD$:IFD$=""ORD$<>"Y"A
       NDD$<>"N"THEN630
SD 640 IFD$="Y"THEN570
KP 650 NU=NU+1:GOTO560
GC 660 PRINT"{CLR}{2 DOWN}
       {RVS}EXERCISE PROGRAM:"
       NA$:PRINT"{RVS}NUMBER O
       F EVENTS:"X
QH 670 PRINT"{2 DOWN}INSERT YO
       UR DATA DISKETTE INTO"
MS 680 PRINT"THE DRIVE.
       {2 SPACES}PRESS ← WHEN
       {SPACE}READY.":GOSUB171
       0
EE 690 GETD$:IFD$<>"←"THEN690
BP 700 PRINT"{CLR}{2 DOWN}
       {CYN}{RVS}...SAVING DAT
       A"
GR 710 OPEN1,8,5,"0:"+NA$+",S,
       W":FORNU=1TOX:PRINT#1,N
       A$(NU):PRINT#1,TL$(NU):
       NEXT
CB 720 PRINT#1:CLOSE1:OPEN1,8,
       5,"0:"+NA$+".IDX,S,W":P
       RINT#1,X:PRINT#1:CLOSE1
EQ 730 GOSUB1660:IFE<>63THEN85
       0
XH 740 PRINT"{CLR}{2 DOWN}
       {WHT}A FILE WITH THE SA
       ME NAME AS{CYN}"
QD 750 PRINTNA$"{WHT} EXISTS O
       N THE DISK."
RD 760 PRINT"{DOWN}DO YOU WISH
        TO REPLACE THE OLD FIL
       E"
GS 770 PRINT"WITH THE NEW (Y/N
       )?":GOSUB1710
HK 780 GETD$:IFD$=""ORD$<>"Y"A
       NDD$<>"N"THEN780
JA 790 IFD$="N"THEN820
KC 800 PRINT"{CLR}{2 DOWN}
       {CYN}{RVS}...ERASING OL
       D FILE"
SF 810 PRINT#15,"S0:"+NA$:PRIN
       T#15,"S0:"+NA$+".IDX":G
       OTO700
PG 820 PRINT"{CLR}{2 DOWN}
       {WHT}ENTER NEW NAME FOR
        PROGRAM:":GOSUB1710:IN
       PUTNA$
PD 830 IFLEN(NA$)>12THEN820
JK 840 GOTO700
DM 850 PRINT"{CLR}{2 DOWN}
       {WHT}DO YOU WISH TO REP
       EAT SAVE (Y/N)?":GOSUB1
       710
CP 860 GETD$:IFD$=""ORD$<>"Y"A
       NDD$<>"N"THEN860
SC 870 IFD$="Y"THEN660
HD 880 IFD$="N"THEN220
XR 890 PRINT"{CLR}{2 DOWN}
       {WHT}PLACE YOUR EXERCIS
       E DATA DISKETTE"
RE 900 PRINT"INTO THE DISK DRI
       VE.{2 SPACES}ENTER THE"
FR 910 PRINT"WORKOUT PROGRAM Y
       OU WANT TO RECALL.":GOS
       UB1710
QK 920 NA$="":INPUTNA$:IFNA$="
       "THEN220
RP 930 IFLEN(NA$)>12THEN920
JC 940 PRINT"{CLR}{2 DOWN}
       {CYN}{RVS}...RECALLING
       {SPACE}FILE"
JH 950 OPEN1,8,5,"0:"+NA$+".ID
       X,S,R":INPUT#1,X:CLOSE1
FD 960 OPEN1,8,5,"0:"+NA$+",S,
       R":FORNU=1TOX:INPUT#1,N
       A$(NU),TL$(NU):NEXT:CLO
       SE1
KR 970 GOSUB1660:IFE<>0THEN220
GX 980 PRINT"{CLR}{2 DOWN}
       {WHT}PRESS {RVS}{YEL}R
       {OFF}{WHT} TO RUN PACER
       "
CA 990 PRINT"{6 SPACES}{RVS}
       {YEL}E{OFF}{WHT} TO EDI
       T/REVIEW PROGRAM.":GOSU
       B1710
DS 1000 GETD$:IFD$=""ORD$<>"R"
        ANDD$<>"E"THEN1000
FR 1010 IFD$="R"THEN1320
GK 1020 NU=1
RB 1030 PRINT"{CLR}{CYN}{RVS}P
        ROGRAM: "NA$:PRINT"
        {RVS}NUMBER OF EVENTS:
        "X
MP 1040 PRINT"{DOWN}{WHT}EVENT
         NAME:":PRINT"{RVS}"NA
        $(NU)
PF 1050 PRINT"{DOWN}{WHT}EVENT
         NUMBER:":PRINT"{RVS}"
        NU
SX 1060 PRINT"{DOWN}{YEL}TIME
        {SPACE}LIMIT:":PRINT"
        {RVS}"TL$(NU)
SG 1070 PRINT"{DOWN}{GRN}PRESS
         <F1> TO SEE FIRST EVE
        NT"
XH 1080 PRINT"PRESS <F3> TO SE
        E NEXT EVENT"
FC 1090 PRINT"PRESS <F5> TO SE
        E PREVIOUS EVENT"
DG 1100 PRINT"PRESS <F7> TO SE
        E LAST EVENT"
QK 1110 PRINT"PRESS <A> TO ADD
         ADDITIONAL EVENTS"
SC 1120 PRINT"PRESS <E> TO EDI
        T"
FS 1130 PRINT"{DOWN}{7}PRESS <
        R> TO RUN PACER"
DR 1140 PRINT"PRESS <M> TO GO
        {SPACE}BACK TO MAIN ME
        NU.":GOSUB1710
SQ 1150 GETD$:IFD$=""THEN1150
QX 1160 IFD$="{F1}"THENNU=1:GO
        TO1030
ED 1170 IFD$="{F3}"ANDNU<>400A
        NDNU<XTHENNU=NU+1:GOTO
        1030
CA 1180 IFD$="{F5}"ANDNU<>1THE
        NNU=NU-1:GOTO1030
HK 1190 IFD$="{F7}"THENNU=X:GO
        TO1030
JH 1200 IFD$="A"THENNU=X+1:GOT
        O570
EE 1210 IFD$="E"THEN1270
RK 1220 IFD$="R"ANDFG=1THENFL=
        1:FG=0:GOTO660
CS 1230 IFD$="M"ANDFG=1THENFG=
        0:GOTO660
RS 1240 IFD$="R"THEN1320
JX 1250 IFD$="M"THEN220
KB 1260 GOTO1150
XD 1270 FG=1:INPUT"{DOWN}{WHT}
        ENTER NEW NAME:";NA$(N
        U)
CJ 1280 IFLEN(NA$(NU))>35THEN1
        270
XR 1290 INPUT"{DOWN}{YEL}ENTER
         NEW TIME LIMIT (MMSS)
        :";TL$(NU)
BQ 1300 IFLEN(TL$(NU))>4THEN12
        90
EA 1310 GOTO1030
QX 1320 FL=0:FG=0:PRINT"{CLR}"
RQ 1330 PRINT"{HOME}{6 DOWN}
        {5 SPACES}PRESS SPACE
        {SPACE}BAR TO START PA
        CER!":D=200:GOSUB1760
SP 1340 GETD$:IFD$=CHR$(32)THE
        N1370
KC 1350 PRINT"{HOME}{6 DOWN}
        {5 SPACES}{RVS}PRESS S
        PACE BAR TO START PACE
        R!":D=200:GOSUB1760
FG 1360 GOTO1330
DM 1370 GOSUB1740:POKE650,0:DM
        =FRE(0):SYS49152:FORNU
        =1TOX:CG=0
DB 1380 PRINT"{CLR}{3 DOWN}
        {YEL}TIME OF DAY: "
RK 1390 PRINT"{HOME}{7 DOWN}
        {YEL}EXERCISE:":PRINT"
        {DOWN} {WHT}{RVS}"NA$(
        NU)
SQ 1400 PRINT"{DOWN}{YEL}EVENT
         #:{WHT}{RVS}"NU:PRINT
        "{YEL}EVENTS TO GO:
        {WHT}{RVS}"X-NU
KK 1410 PRINT"{DOWN}{YEL}TIME
        {SPACE}LIMIT: {WHT}
        {RVS}"MID$(TL$(NU),1,2
        )":"MID$(TL$(NU),3,2)
CC 1420 PRINT"{DOWN}{YEL}TIME
        {SPACE}ELAPSED: {WHT}"
        :POKE56587,0:POKE56586
        ,0:POKE56585,0:POKE565
        84,0
XP 1430 PRINT"{YEL}UP NEXT:":P
        RINT" {6}{RVS}"NA$(NU+
        1)
FF 1440 PRINTSPC(9)"{DOWN}
        {CYN}PRESS <SPACE> TO
        {SPACE}PAUSE"
RS 1450 PRINTSPC(4)"PRESS <↑>
        {SPACE}TO JUMP TO NEXT
         EVENT"
RJ 1460 PRINTSPC(2)"KEEP PRESS
        ING <←> TO ABORT EXERC
        ISE"
RE 1470 GOSUB1510:GOSUB1570
XE 1480 GETD$:IFD$="←"THENGOSU
        B1550:GOTO220
ED 1490 IFCG=1THENNEXT:GOTO156
        0
SD 1500 GOTO1470
KX 1510 ZF=0:FORZ=1TO4:IFPEEK(
        1019+Z)-48<>VAL(MID$(T
        L$(NU),Z,1))THENZF=1
KR 1520 NEXT:IFZFTHENRETURN
EF 1530 GOSUB1720:CG=1:RETURN
SH 1540 GOTO1390
JQ 1550 POKE56333,127:POKE788,
        49:POKE789,234:POKE563
        33,129:RETURN
DD 1560 GOSUB1550:PRINT"{CLR}
        {5 DOWN}{14 SPACES}YOU
        'RE DONE!":GOSUB1740:G
        OTO220
QJ 1570 GETD$:IFD$=""THENRETUR
        N
```

```
PH 1580 IFD$=CHR$(32)THEN1610
GG 1590 IFD$="↑"THENCG=1:RETUR
        N
BF 1600 RETURN
SM 1610 POKE198,0
GD 1620 POKE56587,0:POKE56586,
        (PEEK(1020)-48)*16+PEE
        K(1021)-48
RJ 1630 POKE56585,(PEEK(1022)-
        48)*16+PEEK(1023)-48
QP 1640 GETD$:IFD$<>CHR$(32)TH
        EN1620
ME 1650 POKE56584,0:RETURN
RQ 1660 INPUT#15,E,E$:IFE=0THE
        NRETURN
BH 1670 PRINT"{CLR}{2 DOWN}
        {CYN}{RVS}DISK STATUS:
        ":PRINT"{DOWN}{7}{RVS}
        NUMBER","ERROR":PRINT"
        {6}"E,E$
CA 1680 PRINT"{2 DOWN}{WHT}PRE
        SS C TO CONTINUE.":GOS
        UB1710
SC 1690 GETD$:IFD$<>"C"THEN169
        0
PP 1700 RETURN
KC 1710 POKE54276,17:D=200:GOS
        UB1760:POKE54276,16:RE
        TURN
XA 1720 FORR=1TO5:POKE54283,33
        :POKEV+21,1:D=800:GOSU
        B1760
FF 1730 POKEV+21,2:POKE54283,3
        2:D=800:GOSUB1760:NEXT
        :POKEV+21,0:RETURN
JQ 1740 FORR=1TO40:POKE54290,2
        1:D=50:GOSUB1760:POKE5
        4290,20:D=50:GOSUB1760
        :NEXT
JX 1750 RETURN
SC 1760 FORY=1TOD:NEXT:RETURN
SH 1770 DATA255,255,255,255,25
        5,255,255,255,255,224,
        0,7,224,60,7,224
SG 1780 DATA60,7,226,60,71,225
        ,24,135,224,153,7,224,
        126,7,224,24
GM 1790 DATA7,224,24,7,224,24,
        7,224,24,7,224,60,7,22
        4,66,7
SG 1800 DATA224,129,7,224,0,7,
        255,255,255,255,255,25
        5,255,255,255
GG 1810 DATA255,255,255,255,25
        5,255,255,255,255,224,
        0,7,224,60,7,224
CF 1820 DATA60,7,224,60,7,224,
        24,7,224,24,7,224,126,
        7,224,153
SM 1830 DATA7,225,24,135,226,2
        4,71,224,24,7,224,126,
        7,224,36,7
PD 1840 DATA224,36,7,224,0,7,2
        55,255,255,255,255,255
        ,255,255,255
XC 1850 DATA169,167,141,7,3,16
        9,237,141,40,3,120,169
        ,23,141,20,3,169,192
KP 1860 DATA141,21,3,88,96,160
        ,0,169,10,153,213,216,
        200,192,10,208,248,160
KQ 1870 DATA0,169,1,153,142,21
        8,200,192,5,208,248,17
        3,11,220,41,16,32,197
EP 1880 DATA192,141,213,4,173,
        11,220,41,15,32,202,19
        2,141,214,4,169, 58,14
        1
MD 1890 DATA215,4,141,218,4,14
        1,221,4,141,144,6,173,
        10,220,41,240,32,197
DQ 1900 DATA192,141,216,4,173,
        10,221,41,240,32,197,1
        92,141,252,3,141,142,6
GR 1910 DATA173,10,220,41,15,3
        2,202,192,141,217,4,17
        3,10,221,41,15,32,202
FM 1920 DATA192,141,253,3,141,
        143,6,173,9,220,41,240
        ,32,197,192,141,219,4
KK 1930 DATA173,9,221,41,240,3
        2,197,192,141,254,3,14
        1,145,6,173,9,220,41
GD 1940 DATA15,32,202,192,141,
        220,4,173,9,221,41,15,
        32,202,192,141,255,3
QH 1950 DATA141,146,6,173,8,22
        0,41,15,32,202,192,141
        ,222,4,76,49,234,24
BS 1960 DATA74,74,74,74,24,105
        ,48,96
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," elsewhere in this issue.

Bee Zone

See instructions in article on page 29 before typing in.

```
0801:15 08 00 00 9E 28 32 31 C8
0809:37 33 29 3A 42 45 45 5A 56
0811:4F 4E 45 00 00 00 00 00 05
0819:00 00 F0 06 A9 46 20 D2 21
0821:FF 60 A5 19 F0 23 20 F4 D8
0829:08 85 35 20 F4 08 85 36 50
0831:A5 37 38 E5 35 85 37 85 FA
0839:1B 85 33 85 35 A5 38 E5 8D
0841:36 85 38 85 1C 85 34 85 12
0849:36 A5 1B 85 1D A5 1C 85 D6
0851:1E A0 00 20 F4 08 85 1A 87
0859:C9 05 F0 21 C9 80 90 03 34
0861:20 D3 08 A5 1A 29 7F C9 10
0869:04 D0 15 20 F4 08 18 65 B1
0871:1B 85 1D 20 F4 08 65 1C C4
0879:85 1E 4C 54 A9 EF 8D 28 F2
0881:03 A9 C1 8D 18 03 A9 40 EE
0889:8D 8A 02 AD 0F 08 C9 45 8F
0891:F0 03 4C E2 FC A9 08 8D BE
0899:18 D4 4C 25 15 F4 C9 01 D7
08A1:F0 05 A9 00 8D 15 D0 78 7B
08A9:A9 31 8D 14 03 A9 EA 8D EF
08B1:15 03 58 60 1B 20 F4 08 69
08B9:65 1C 20 DA 08 4C 54 00 4F
08C1:00 00 00 00 00 00 00 00 D1
08C9:00 00 00 00 00 00 00 00 D9
08D1:00 08 20 80 02 66 00 00 99
08D9:A8 00 00 A8 00 00 20 00 09
08E1:00 54 00 02 AA 00 01 55 D3
08E9:00 02 AA 00 01 55 00 02 2F
08F1:AA 00 01 55 00 00 A8 00 1E
08F9:00 54 00 00 20 00 00 00 20
0901:20 00 00 54 00 00 A8 00 B9
0909:01 55 00 02 AA 00 01 55 BD
0911:00 02 AA 00 01 55 00 02 58
0919:AA 00 00 54 00 00 20 00 06
0921:00 A8 00 00 A8 00 02 66 0D
0929:00 08 20 80 00 00 00 00 49
0931:00 00 00 00 00 00 00 00 43
0939:00 00 00 00 00 00 00 00 4B
0941:00 00 00 00 00 00 00 00 53
0949:00 00 00 00 00 00 80 00 5C
0951:00 20 06 40 20 26 60 18 A2
0959:66 64 AA 66 66 28 66 64 78
0961:00 26 60 00 06 40 00 08 42
0969:80 00 08 20 00 00 00 00 BE
0971:00 00 00 00 00 00 00 00 83
0979:00 00 00 00 00 00 48 00 1C
0981:00 00 00 00 00 00 00 00 93
0989:00 00 00 00 00 00 00 00 9B
0991:02 01 90 08 09 98 08 19 4B
0999:99 24 99 99 AA 19 99 28 63
09A1:09 98 00 01 90 00 02 20 17
09A9:00 08 20 00 00 00 00 00 C1
09B1:00 00 00 00 00 00 00 00 C3
09B9:00 00 00 00 00 00 48 00 5C
09C1:00 00 00 00 00 00 00 00 D3
09C9:00 00 00 00 00 00 00 00 DB
09D1:00 00 00 00 00 E0 00 01 68
09D9:F0 00 01 F8 00 03 F8 00 12
09E1:03 F8 00 03 F0 00 01 F0 5E
09E9:00 00 E0 00 00 00 00 00 18
09F1:00 00 00 00 00 00 00 00 04
09F9:00 00 00 00 00 00 00 00 0C
0A01:0C 00 00 3C 00 00 38 00 4F
0A09:00 3F 00 00 FC 00 00 FC D1
0A11:00 00 FF 40 00 FC 00 00 1D
0A19:FF 40 00 28 00 00 3C 00 38
0A21:00 3C 00 00 3C 00 00 3C 62
0A29:00 00 3C 00 00 3C 00 00 B5
0A31:3C 00 00 3C 00 00 3C 00 9F
0A39:00 3E 00 00 38 00 00 00 9E
0A41:30 00 00 3C 00 00 2C 00 89
0A49:00 FC 00 00 3F 00 00 3F D5
0A51:00 01 FF 00 00 3F 00 01 A3
0A59:FF 00 00 28 00 00 3C 00 68
0A61:00 3C 00 00 3C 00 00 3C A2
0A69:00 00 3C 00 00 3C 00 00 F5
0A71:3C 00 00 3C 00 00 3C 00 DF
0A79:00 BC 00 00 2C 00 00 00 1E
0A81:30 00 00 FC 00 00 B8 00 EE
0A89:00 EC 00 03 FF 00 03 FF 0F
0A91:00 03 FF 00 03 FF 00 03 81
0A99:FF 00 03 FF 00 00 74 00 F6
0AA1:00 A8 00 00 FC 00 00 CC 94
0AA9:00 00 CC 00 00 CC 00 00 8A
0AB1:CC 00 00 CC 00 00 CC 00 92
0AB9:00 CC 00 00 88 00 00 00 45
0AC1:30 00 00 FC 00 00 FC 00 B7
0AC9:00 FC 00 03 FF 00 03 FF 53
0AD1:00 00 FF 40 0F FF C0 0F B4
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0AF9:02 CE 00 00 CC 00 00 00 29
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0B09:00 00 00 00 18 00 00 3C 1C
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0B69:64 64 00 64 64 00 64 64 61
0B71:00 64 64 01 64 65 56 90 33
0B79:6A A9 40 55 54 00 55 55 2F
0B81:55 54 6A AA A4 65 55 54 09
0B89:64 00 00 64 00 00 64 00 E0
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0B99:00 00 65 54 00 6A A4 00 94
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0BE9:00 06 40 00 1A 40 00 19 74
0BF1:00 00 69 00 00 65 55 54 C9
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0C59:64 19 64 69 19 64 19 19 B2
0C61:64 1A 59 64 06 59 64 06 08
0C69:59 64 06 99 64 01 99 64 60
0C71:01 99 64 00 69 64 00 69 43
0C79:64 00 19 54 00 15 00 83 04
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0C89:A9 08 8D 6F 0D A9 0A 8D D1
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0C99:9E 20 D2 FF AD 6F 0D C9 72
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0F09:23 8D FB 07 4C 31 EA CE D7
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1019:FF CA 4C 0C 10 AE EB 02 4B
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1041:78 10 20 8B 10 A9 20 20 E5
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1059:92 20 D2 FF A9 DF 20 D2 05
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10F1:20 1E AB 18 A0 20 A2 01 6C
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1139:1F 48 49 2D 53 43 4F 52 91
1141:45 00 1E 4C 49 56 45 53 10
1149:05 00 00 00 00 00 00 00 ED
1151:00 00 00 00 00 00 00 A0 14
1159:00 A9 00 99 4B 11 88 C0 EF
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11D9:02 D0 A9 DC 8D 03 D0 A9 F7
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1269:1D BD 18 05 C9 A0 F0 2A BB
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1279:A2 1D BD 90 05 C9 A0 F0 78
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12F1:00 00 00 0B 12 D1 00 00 9E
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13D1:C3 0E 18 0B 12 D1 10 C3 CC
13D9:00 00 0B 11 C3 10 C3 00 58
13E1:00 0B 17 B5 0E 18 10 C3 BD
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1439:0B 30 0E 18 0B 11 C3 0B 65
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15C9:15 4C D8 18 AD 10 D0 49 C6
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16E9:0C D0 A9 C8 8D 0E D0 A9 02
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1861:CE 00 D0 CA E0 00 F0 10 B8
1869:20 E8 18 AD D7 02 C9 01 1D
1871:F0 03 4C 61 18 4C D8 18 36
1879:A2 19 CE 00 D0 EE 02 D0 32
1881:20 E8 18 AD D7 02 C9 01 35
1889:F0 EB CA E0 00 D0 EB A2 52
1891:32 EE 02 D0 20 E8 18 AD 66
1899:D7 02 C9 01 F0 24 AD 02 F4
18A1:D0 C9 FF F0 08 CA E0 00 E8
18A9:F0 18 4C 92 18 AD 10 D0 73
18B1:09 03 8D 10 D0 A9 00 8D 94
18B9:02 D0 CA E0 00 F0 03 4C 9C
18C1:92 18 A9 00 8D 15 D0 8D 66
18C9:D7 02 A9 02 8D 1A 1A A9 6E
18D1:00 8D 1A 1A 4C 28 15 A9 21
18D9:00 8D 15 D0 8D D7 02 A9 96
18E1:02 8D 1A 1A 4C 89 1C 8E AA
18E9:31 19 8C 32 19 8D 33 19 2C
18F1:AE 34 19 8E 35 19 CA E0 17
18F9:00 F0 0A A0 FF 88 C0 00 55
1901:F0 F4 4C FE 18 A5 C5 C9 0F
1909:3F F0 10 AD 35 19 8D 34 51
1911:19 AD 33 19 AE 31 19 AC 4C
1919:32 19 60 A9 01 8D D7 02 41
1921:AD 35 19 8D 34 19 AD 33 08
1929:19 AE 31 19 AC 32 19 60 0C
1931:00 E0 3E 0A 0A 00 00 00 54
1939:00 00 00 00 00 A0 17 A9 C5
1941:00 99 00 D4 88 D0 FA A0 45
1949:E0 84 FB A9 12 85 FC A9 71
1951:14 8D 02 D4 8D 03 D4 A9 4A
1959:32 8D 05 D4 8D 06 D4 A9 CD
1961:14 8D 09 D4 8D 0A D4 A9 57
1969:32 8D 0C D4 8D 0D D4 A9 DA
1971:14 8D 10 D4 8D 11 D4 A9 64
1979:32 8D 13 D4 8D 14 D4 78 B6
1981:A9 8D A2 19 8D 14 03 8E 23
1989:15 03 58 60 AD 1A 1A F0 13
1991:07 C9 02 F0 71 4C 31 EA 13
1999:AD 21 1A F0 06 CE 21 1A 05
19A1:4C 31 EA AD 1E 1A 8D 04 F6
19A9:D4 AD 1F 1A 8D 0B D4 AD 27
19B1:20 1A 8D 12 D4 18 A5 FB 9B
19B9:69 07 85 FB A5 FC 69 00 C6
19C1:85 FC A0 00 B1 FB 8D 01 A3
19C9:D4 C8 B1 FB 8D 00 D4 C8 6D
19D1:B1 FB 8D 08 D4 C8 B1 FB 37
19D9:8D 07 D4 C8 B1 FB B1 FB 98
19E1:8D 0F D4 C8 B1 FB 8D 0E 6C
19E9:D4 C8 B1 FB F0 18 8D 21 D2
19F1:1A AD 1B 1A 8D 04 D4 AD 75
19F9:1C 1A 8D 0B D4 AD 1D 1A D4
1A01:8D 12 D4 4C 31 EA A9 E0 49
1A09:85 FB A9 12 85 FC A9 01 C9
1A11:8D 1A 1A 8D 21 1A 4C 31 E9
1A19:EA 02 11 11 11 10 10 10 6F
1A21:09 60 A9 13 20 D2 FF AE 53
1A29:C7 02 E0 00 F0 09 A9 11 ED
1A31:20 D2 FF CA 4C 2B 1A AE C8
1A39:C8 02 E0 00 F0 09 A9 1D 8A
1A41:20 D2 FF CA 4C 3B 1A A9 14
1A49:CE 20 D2 FF A9 A3 20 D2 36
1A51:FF A9 CD 20 D2 FF 20 7F 02
1A59:1A A9 A5 20 D2 FF A9 20 C5
1A61:20 D2 FF A9 A7 20 D2 FF 58
1A69:20 7F 1A A9 CD 20 D2 FF FF
1A71:A9 A4 20 D2 FF A9 CE 20 39
1A79:D2 FF 20 7F 1A 60 A2 03 AD
1A81:A9 9D 20 D2 FF CA F0 03 33
1A89:4C 81 1A A9 11 20 D2 FF D0
1A91:60 24 A9 00 8D E2 02 AD DD
1A99:00 DC C9 7D F0 0D C9 7E E3
1AA1:F0 0C C9 7B F0 0B C9 77 01
1AA9:F0 0A 60 4C B8 1A 4C E4 55
1AB1:1A 4C 10 1B 4C 3C 1B AD F0
1AB9:CB 02 C9 07 F0 D9 A9 2A 6A
1AC1:8D F8 07 EE CB 02 20 86 F7
1AC9:1B A2 18 EE 01 D0 CA E0 E7
1AD1:00 F0 06 20 69 1B 4C CC 22
1AD9:1A 20 AE 1B 20 23 1A AD 1A
1AE1:E2 02 60 AD CB 02 C9 00 E8
1AE9:F0 AD A9 2B 8D F8 07 CE 17
1AF1:CB 02 20 86 1B A2 18 CE 5B
1AF9:01 D0 CA E0 00 F0 06 20 3A
1B01:69 1B 4C F8 1A 20 AE 1B 95
1B09:20 23 1A AD E2 02 60 AD C3
1B11:CC 02 C9 00 F0 51 A9 29 B0
1B19:8D F8 07 CE CC 02 20 99 6A
1B21:1B A2 18 CE 00 D0 CA E0 37
1B29:00 F0 06 20 69 1B 4C 24 D2
1B31:1B 20 AE 1B 20 23 1A AD F3
1B39:E2 02 60 AD CC 02 C9 09 53
1B41:F0 25 A9 28 8D F8 07 EE 3E
1B49:CC 02 20 99 1B A2 18 EE 86
1B51:00 D0 CA E0 00 F0 06 20 13
1B59:69 1B 4C 50 1B 20 AE 1B 6B
1B61:20 23 1A AD E2 02 60 60 CE
1B69:8E CD 02 A2 00 A0 00 E8 30
1B71:E0 FF F0 03 4C 70 1B C8 89
1B79:C0 03 F0 05 A2 00 4C 70 5D
1B81:1B AE CD 02 60 AE CB 02 22
1B89:A9 00 E0 00 F0 06 69 02 25
1B91:CA 4C 8B 1B 8D C7 02 60 53
1B99:AE CC 02 E0 01 A9 00 E0 38
1BA1:00 F0 06 69 02 CA 4C A0 DF
1BA9:1B 8D C8 02 60 AE C8 02 5B
1BB1:AC C7 02 98 18 69 01 A8 0B
1BB9:8A 18 69 01 AA 8E DF 02 C9
1BC1:8C E0 02 18 AE E0 02 AC E1
1BC9:DF 02 20 0A E5 A4 D3 B1 30
1BD1:D1 8D E1 02 C9 A0 F0 01 64
1BD9:60 A9 0A 8D E2 02 60 0A AE
1BE1:EA EA EA C9 01 F0 2B C9 2E
1BE9:02 F0 3E A9 05 8D 0C D4 0B
1BF1:8D 0D D4 A9 08 8D 08 D4 C2
1BF9:A9 32 8D 07 D4 A9 21 8D D0
1C01:0B D4 A2 FF A0 FF 88 D0 2F
```

```
1C09:FD CA D0 F8 A9 20 8D 0B 90
1C11:D4 60 A9 14 8D 08 D4 A9 22
1C19:51 8D 07 D4 A9 21 8D 0B 83
1C21:D4 A9 64 8D 0C D4 4C 03 E2
1C29:1C A9 18 8D 08 D4 A9 92 2F
1C31:8D 07 D4 8D 0B D4 A9 00 64
1C39:8D 0C D4 A9 08 8D 0D D4 D5
1C41:A9 11 8D 0B D4 A2 FF CA F0
1C49:D0 FD A9 10 8D 0B D4 A2 84
1C51:FF A0 FF 88 D0 FD CA D0 1F
1C59:F8 A2 FF A0 FF 88 D0 FD 82
1C61:CA D0 F8 A9 0A 8D 08 D4 58
1C69:A9 F1 8D 07 D4 A9 11 8D 12
1C71:0C D4 A9 C8 8D 0D D4 A9 9A
1C79:21 8D 0B D4 A2 FF CA D0 CF
1C81:FD A9 10 8D 0B D4 60 61 CB
1C89:A0 17 A9 00 99 00 D4 88 0C
1C91:D0 FA A9 00 20 9F 08 20 D5
1C99:58 11 A9 00 8D 10 D0 A9 6F
1CA1:00 8D 17 D0 8D 1D D0 A9 59
1CA9:04 8D D0 02 A9 64 8D 08 83
1CB1:D0 A9 64 8D E4 02 4C C2 AC
1CB9:1C A9 4B 8D E2 02 20 92 9E
1CC1:10 A9 00 20 9F 08 20 81 4D
1CC9:0C 20 69 11 AD 1E D0 A9 7F
1CD1:00 8D E2 02 20 92 10 A9 FE
1CD9:32 20 B7 1D A9 02 20 E1 73
1CE1:1B 20 72 0D 20 73 0F A9 65
1CE9:9E 20 D2 FF 20 93 1A 20 77
1CF1:92 10 A5 91 C9 7F F0 26 99
1CF9:AD 8D 02 C9 01 D0 03 20 BA
1D01:A7 1D 20 13 12 20 46 12 3B
1D09:AD CA 02 C9 00 F0 AA AD 70
1D11:E5 02 8D EE 02 29 01 C9 DF
1D19:01 F0 0B 4C E5 1C A9 06 2F
1D21:8D 18 D4 4C 25 15 AD EE 4F
1D29:02 29 21 C9 21 F0 23 A9 2C
1D31:01 20 9F 08 CE D0 02 AD D3
1D39:D0 02 F0 4B A9 00 20 E1 9E
1D41:1B 20 69 11 AD 1E D0 A9 80
1D49:00 8D E5 02 20 72 0D 4C F4
1D51:E5 1C EE D0 02 AD D0 02 DA
1D59:C9 0A D0 03 CE D0 02 A9 AC
1D61:32 8D E2 02 20 92 10 A9 A9
1D69:01 20 E1 1B A9 00 8D E5 68
1D71:02 8D EE 02 AD 15 D0 29 9A
1D79:DF 8D 15 D0 A9 00 8D E5 05
1D81:02 AD 1E D0 4C E5 1C A9 D4
1D89:32 20 B7 1D 20 69 11 18 8E
1D91:A0 0A A2 0A 20 F0 FF A9 02
1D99:EB A0 1D 20 1E AB A9 64 EE
1DA1:20 B7 1D 4C 1F 1D A9 01 04
1DA9:20 9F 08 AD 8D 02 C9 01 C0
1DB1:F0 F9 20 72 0D 60 A8 CE 18
1DB9:E6 1D AD E6 1D D0 F8 CE BF
1DC1:E7 1D AD E7 1D D0 F8 CE 58
1DC9:E8 1D AD E8 1D D0 F8 CE F0
1DD1:E9 1D AD E9 1D D0 F8 CE 89
1DD9:EA 1D AD EA 1D D0 F8 88 DB
1DE1:C0 00 D0 D3 60 00 00 00 D6
1DE9:00 00 1F 12 47 41 4D 45 48
1DF1:20 4F 56 45 52 92 00 90 9C
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," elsewhere in this issue.

DoublePrint

Article on page 58.

```
BE 10 REM COPYRIGHT 1987 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
SB 20 PRINT"{CLR}{2 SPACES}COP
      YRIGHT 1987 COMPUTE! PUB
      ., INC."
SE 30 PRINTTAB(9)"ALL RIGHTS R
      ESERVED"
FP 40 PRINT"{2 DOWN}WORKING.";
      :POKE53280,0:POKE53281,0
MM 50 FORX=0TO254:READA:POKEX+
      49152,A:C=C+A:PRINT".";:
      NEXT
CF 60 IFC-32355THENPRINT:PRINT
      "ERROR IN DATA":END
FF 70 SYS49152:PRINT"{CLR}
      {BLU}SYS49152 {YEL}TO AC
      TIVATE":PRINT"{DOWN}
      {PUR}{2 SPACES}- - - - -
      - - - - - -"
JB 80 PRINT"{DOWN}{GRN}SYS4939
      1 {RED}TO SHUT OFF":END
QJ 90 DATA173,14,220,41,254,14
      1,14,220,165,1
GF 100 DATA41,251,133,1,169,20
      8,133,252,169,56
MX 110 DATA133,254,160,0,132,2
      51,132,253,169,0
GH 120 DATA145,253,177,251,41,
      128,240,2,169,192
FB 130 DATA32,159,192,41,64,24
      0,2,169,48,32
DB 140 DATA159,192,41,32,240,2
      ,169,12,32,159
SE 150 DATA192,41,16,240,5,169
      ,3,32,159,192
GC 160 DATA165,254,24,105,4,13
      3,254,169,0,145
CP 170 DATA253,177,251,41,8,24
      0,2,169,192,32
SQ 180 DATA159,192,41,4,240,2,
      169,48,32,159
CX 190 DATA192,41,2,240,2,169,
      12,32,159,192
DA 200 DATA41,1,240,5,169,3,32
      ,159,192,165
HA 210 DATA254,56,233,4,133,25
      4,165,253,24,105
HB 220 DATA1,133,253,165,254,1
      05,0,133,254,165
HH 230 DATA251,24,105,1,133,25
      1,165,252,105,0
EB 240 DATA133,252,201,212,240
      ,10,76,28,192,17
SX 250 DATA253,145,253,177,251
      ,96,165,1,9,4
SR 260 DATA133,1,173,14,220,9,
      1,141,14,220
BP 270 DATA169,208,141,38,3,16
      9,192,141,39,3
ES 280 DATA169,30,141,24,208,1
      62,0,169,255,157
XC 290 DATA0,61,232,224,8,208,
      246,96,141,238
RM 300 DATA192,32,202,241,173,
      238,192,201,33,144
QB 310 DATA16,169,18,32,202,24
      1,173,238,192,32
JG 320 DATA202,241,169,146,32,
      202,241,96,0,169
CM 330 DATA241,141,39,3,169,20
      2,141,38,3,169
GR 340 DATA21,141,24,208,96
```

Program Appender

Article on page 68.

```
BC 0 REM COPYRIGHT 1987 COMPUT
     E! PUBLICATIONS, INC. - A
     LL RIGHTS RESERVED
DA 1 BU=631:BC=198:S1=43:S2=44
     :A=PEEK(S1):B=PEEK(S2):C=
     PEEK(45):D=PEEK(46)
KX 2 INPUT"{CLR}{DOWN}PROGRAM
     {SPACE}TO APPEND";PROG$:I
     FPROG$="QUIT"THEN9
EP 3 OPEN15,8,15,"I0:":OPEN1,8
     ,8,PROG$+",P,R":INPUT#15,
     E,E$
JH 4 CLOSE1:CLOSE15:IFETHENPRI
     NT"{DOWN}ERROR:"E;E$:END
AP 5 PRINT"{CLR}{3 DOWN}LOAD"C
     HR$(34)PROG$CHR$(34)",8"
AK 6 PRINT"{4 DOWN}POKE"S1","A
     ":POKE"S2","B"{HOME}":POK
     EBU,13:POKEBU+1,13:POKEBC
     ,2
KG 7 IFC>1THENPOKES1,C-2:POKES
     2,D:END
XD 8 POKES1,C+253:POKES2,D-1:E
     ND
JD 9 PRINT"{CLR}{2 DOWN}":FORJ
     =0TO9:PRINTJ:POKEBU+J,13:
     NEXT:POKEBC,10:PRINT"
     {HOME}":END
```

SpeedSort

See instructions in article on page 66 before typing in.

```
C000:A9 00 85 02 20 FD AE 20 9D
C008:79 00 8D B1 C2 A9 80 8D 5E
C010:B2 C2 20 73 00 C9 24 F0 37
C018:19 09 80 8D B2 C2 20 73 A5
C020:00 D0 07 A9 FF 85 0D 4C CD
C028:8D AD C9 3A F0 7F C9 24 F5
C030:D0 EC 20 E3 C0 20 73 00 05
C038:20 F1 AE 20 8D AD 20 9B 1D
C040:BC A5 63 D0 6B A5 2F 85 D8
C048:FB A5 30 85 FC A0 01 B1 AD
C050:FB D9 B1 C2 D0 64 88 10 E1
C058:F6 A0 02 B1 FB 18 65 FB DF
C060:8D B5 C2 C8 B1 FB 65 FC 40
C068:8D B6 C2 AD B5 C2 38 E9 A4
C070:07 8D AE C2 AD B6 C2 E9 92
C078:00 8D AF C2 A2 03 A5 FB E7
C080:18 65 65 85 FB A5 FC 65 42
C088:64 85 FC CA D0 F0 A5 FC 7C
C090:CD AF C2 90 0B D0 19 A5 B9
C098:FB CD AE C2 90 02 B0 10 8B
C0A0:A5 FB 8D B3 C2 A5 FC 8D 15
C0A8:B4 C2 4C 06 C1 4C FD AE 09
C0B0:4C 45 B2 A9 FF 85 0D 4C 17
C0B8:8D AD A0 02 B1 FB 18 65 B3
C0C0:FB 8D B0 C2 C8 B1 FB 65 50
C0C8:FC 85 FC AD B0 C2 85 FB 3C
C0D0:A5 FC C5 32 90 0A D0 D8 67
C0D8:A5 FB C5 31 90 02 B0 D0 B6
C0E0:4C 4D C0 A5 7B 48 A5 7C 13
C0E8:48 A0 00 B1 7B F0 0B C9 51
C0F0:2C F0 0E C9 3A F0 03 C8 87
C0F8:D0 F1 68 85 7C 68 85 7B D0
C100:60 68 68 4C FD AE BA 86 46
C108:FC 86 FD 8A 38 E9 52 B0 D2
C110:01 60 69 02 85 FE A2 13 F9
C118:B5 0A 48 CA 10 FA BA 86 17
C120:FC A9 00 48 48 18 AD B3 C2
C128:C2 69 07 85 19 AD B4 C2 4C
C130:69 00 85 1A 18 A0 02 AD AF
C138:B5 C2 AA C8 AD B6 C2 A8 9F
C140:38 8A E9 03 85 1B 48 98 B1
C148:E9 00 85 1C 48 D0 02 D0 8D
C150:D0 A2 03 B5 19 95 0A CA 9E
C158:10 F9 18 A5 0A 65 0C AA 68
C160:A5 0B 65 0D 4A 85 0F 8A 08
C168:6A 90 06 E9 01 B0 02 C6 3A
C170:0F 85 0E A0 00 B1 0E 85 11
C178:16 C8 B1 0E 85 17 C8 B1 1C
C180:0E 85 18 A0 00 B1 0A 85 D9
C188:10 C8 B1 0A 85 11 C8 B1 D0
C190:0A 85 12 A2 00 A5 10 C5 63
C198:16 90 03 E8 A5 16 85 1D E7
C1A0:A0 00 B1 11 D1 17 D0 07 4F
C1A8:C8 C4 1D 90 F5 E0 01 B0 54
C1B0:11 18 A5 0A 69 03 85 0A 84
C1B8:90 C9 E6 0B B0 C5 90 91 D3
```

```
C1C0:D0 8D A0 00 B1 0C 85 13 FF
C1C8:C8 B1 0C 85 14 C8 B1 0C 2A
C1D0:85 15 A2 00 A5 16 C5 13 D4
C1D8:90 03 E8 A5 13 85 1D A0 66
C1E0:00 B1 17 D1 14 D0 07 C8 8B
C1E8:C4 1D 90 F5 E0 01 B0 13 07
C1F0:38 A5 0C E9 03 85 0C B0 11
C1F8:C9 C6 0D 90 C5 B0 84 90 48
C200:BD D0 BD A5 0D C5 0B 90 D0
C208:69 D0 06 A5 0A C5 0C B0 C1
C210:61 A2 02 A0 02 B5 10 91 D1
C218:0C B5 13 91 0A CA 88 10 29
C220:F4 18 A5 0A 69 03 85 0A E7
C228:90 02 E6 0B 38 A5 0C E9 5E
C230:03 85 0C B0 02 C6 0D A5 10
C238:0D C5 0B 90 35 D0 BE A5 30
C240:0C C5 0A B0 B8 90 2B D0 B8
C248:B8 A5 1B 48 A5 1C 48 A5 4F
C250:0C 85 1B A5 0D 85 1C 18 C9
C258:90 A5 18 A5 19 69 03 85 E6
C260:19 90 01 C8 84 1A C4 1C 75
C268:90 95 D0 26 C5 1B 90 8F 63
C270:B0 20 A5 19 A4 1A C4 0D C0
C278:90 08 D0 DE C5 0C 90 02 D1
C280:B0 D8 BA E4 FD B0 C2 86 F8
C288:FD E4 FE B0 BC A6 FC 9A 46
C290:D0 B5 68 85 1C 68 85 1B F9
C298:A6 1C E0 00 D0 BC A6 FC 58
C2A0:9A A2 00 68 95 0A E8 E0 2A
C2A8:14 90 F8 60 F8 60 00 00 CA
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," elsewhere in this issue.

80-Column Magic For The 128

See instructions in article on page 76 before typing in.

Program 1: 80-Column Magic ML Program

```
0B00:20 39 0C A9 18 A2 80 20 FC
0B08:5B 0C A5 FC C9 10 F0 35 F8
0B10:A5 FA AA A9 12 20 5B 0C 7B
0B18:E6 FA A9 13 A2 00 20 5B 77
0B20:0C A5 FB AA A9 20 20 5B 39
0B28:0C E6 FB A9 21 A2 00 20 CB
0B30:5B 0C A9 1E A2 FF 20 5B BE
0B38:0C A9 1E A2 01 20 5B 0C F7
0B40:E6 FC 4C 0A 0B 60 00 00 0D
0B48:00 00 20 39 0C A9 12 A6 C7
0B50:FB 20 5B 0C A9 13 A6 FC 7C
0B58:20 5B 0C A2 1F 20 4F 0C 25
0B60:85 FF A9 12 A6 FB E4 FA 79
0B68:F0 DB 20 5B 0C A9 13 A6 7B
0B70:FC 20 5B 0C A5 FF C5 FD EF
0B78:F0 0B A5 FC C9 FF F0 0F 8D
0B80:E6 FC 4C 4D 0B A9 1F A6 8B
0B88:FE 20 5B 0C 4C 7A 0B A8 5D
0B90:E6 FB A9 00 85 FC 98 4C EB
0B98:4D 0B 20 42 0C A9 12 A6 12
0BA0:FA 20 5B 0C A9 13 A6 FB 4B
0BA8:20 5B 0C A2 1F 20 4F 0C 75
0BB0:85 FF A9 FD 8D B9 02 A5 9B
0BB8:FF A2 01 A4 FC 20 77 FF 39
0BC0:A5 FB C9 FF F0 07 E6 FB 4F
0BC8:E6 FC 4C 9D 0B A5 FA C9 A3
0BD0:0F F0 0D E6 FA E6 FE A9 D5
0BD8:00 85 FC 85 FB 4C 9D 0B 9F
0BE0:60 A5 FA C9 0F F0 0D E6 C9
0BE8:FA E6 FE A9 00 85 FC 85 46
0BF0:FB 4C B1 0B 60 00 20 42 84
0BF8:0C A9 12 A6 FA 20 5B 0C 47
0C00:A9 13 A6 FB 20 5B 0C A9 76
0C08:FD A2 01 A4 FC 20 74 FF 83
0C10:85 FF A9 1F A6 FF 20 5B E2
0C18:0C A5 FB C9 FF F0 07 E6 74
0C20:FB E6 FC 4C F9 0B A5 FA 96
0C28:C9 1F F0 B4 E6 FA E6 FE 46
0C30:A9 00 85 FB 85 FC 4C F9 40
0C38:0B 85 FB 86 FA A9 00 85 23
0C40:FC 60 85 FA 86 FE A9 00 D2
0C48:85 FD 85 FB 85 FC 60 8E 82
0C50:00 D6 2C 00 D6 10 FB AD 40
0C58:01 D6 60 A0 00 8C 00 FF EE
0C60:8D 00 D6 2C 00 D6 10 FB 54
0C68:8E 01 D6 60 A9 00 8D 00 51
0C70:FF 20 0C AF A5 16 8D 00 AD
0C78:D6 2C 00 D6 10 FB AC 01 3F
0C80:D6 A9 00 4C 03 AF 60 00 CA
```

Program 2: 80-Column Magic Demo

```
BE 10 REM COPYRIGHT 1987 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
SM 20 PRINT"{CLR}"TAB(5)"COPYR
      IGHT 1987 COMPUTE! PUBLI
      CATIONS, INC. - ALL RIGH
      TS RESERVED"
CB 30 FAST:BLOAD"MAGIC
SP 40 PRINT CHR$(27)+"M"
GP 50 CHAR 1,32,1,"{PUR}STAND
      {SPACE}BY FOR..."
RH 60 CHAR 1,0,0,"":FOR M=1 TO
       168:PRINT "{BLK}MAGIC!M
      AGIC!";:NEXT
SQ 70 POKE 2829,8:GOSUB 710:SC
      NCLR
DG 80 FOR M=1 TO 168:PRINT "
      {YEL}{2 SPACES}*
      {3 SPACES}{7}{2 SPACES}*
      {3 SPACES}";:NEXT:GOSUB
      {SPACE}730
PD 90 POKE 2829,16:GOSUB 710:S
      LEEP 1
KB 100 POKE 253,3:POKE 254,10:
       GOSUB 750:GOSUB 730
RC 110 POKE 253,13:POKE 254,14
       :GOSUB 750:GOSUB 730
QG 120 GOSUB 830:AD=8:GOSUB 79
       0
DD 130 SZ=17:GOSUB 680
CQ 140 FOR W=0 TO 9:X=W*6:Y=W*
       2:GOSUB 690:READ Y$:CHA
       R 1,X+13-(LEN(Y$)/2),Y+
       3,"{YEL}"+Y$:AD=AD+16:G
       OSUB 790:NEXT
EM 150 AD=AD+16:GOSUB 790:SZ=3
       6:GOSUB 680:X=16:Y=7:GO
       SUB 690:CHAR 1,X+7,Y+3,
       "{3}...THEN MAKE THEM A
       LL GO AWAY!":SLEEP 2
EF 160 FOR I=1 TO 11:AD=AD-16:
       GOSUB 810:GOSUB 730:NEX
       T
GS 170 COLOR 5,4:SZ=1:FOR I=1
       {SPACE}TO 3:GOSUB 680:C
       HAR 1,3,2,CC$(1):CHAR 1
       ,3,3,CC$(3):SZ=SZ+36:NE
       XT
KD 180 FOR J=3 TO 21:CHAR 1,3,
       J,CC$(2):CHAR 1,3,J+1,C
       C$(3):NEXT
KS 190 PRINT CHR$(14)
PJ 200 AD=24:GOSUB 790
DR 210 CHAR 1,10,3,"{WHT}AS YO
       U JUST SAW, YOU CAN CRE
       ATE UP TO 15 INDIVIDUAL
        SCREENS"
CC 220 SLEEP 2:CHAR 1,10,4,"IN
        FULL COLOR AND STASH T
       HEM AWAY IN RAM BANK 1.
       {2 SPACES}YOU MAY THEN"
BS 230 SLEEP 2:CHAR 1,10,5,"BR
       ING THEM ALL BACK THROU
       GH THE 'FREE' RAM IN TH
       E 8563 CHIP SO"
DC 240 SLEEP 2:CHAR 1,10,6,"TH
       AT THEY SEEM TO REAPPEA
       R INSTANTANEOUSLY."
GP 250 SLEEP 3
GS 260 CHAR 1,10,8,"{CYN}YOU M
       AY ALSO:"
KF 270 CHAR 1,10,10,">{7} CHAN
       GE THE COLOR OF {6}SOME
        {7}CHARACTERS WHILE LE
       AVING OTHERS ALONE.":SL
       EEP 1:GOSUB 710:POKE 25
       3,131:POKE 254,139:GOSU
       B 750:GOSUB 730
EC 280 SLEEP 1:CHAR 1,10,12,"
       {CYN}>{6} MAKE SOME OF
       {SPACE}THEM BLINK.":SLE
       EP 1:GOSUB 710:POKE 253
       ,133:POKE 254,149:GOSUB
        750:GOSUB 730:SLEEP 1
KH 290 CHAR 1,38,12,"{6}AND ST
       OP BLINKING.":GOSUB 710
       :POKE 253,149:POKE 254,
       133:GOSUB 750:GOSUB 730
       :SLEEP 1
AM 300 CHAR 1,10,14,"{CYN}>
       {YEL}UNDERLINE{BLK}
       {YEL}IMPORTANT{BLK}
       {YEL}THINGS.":GOSUB 710
       :POKE 253,141:POKE 254,
       173:GOSUB 750:GOSUB 730
       :SLEEP 1
CA 310 CHAR 1,10,16,"{CYN}>
       {3}CHANGE ALL OF THE CH
       ARACTERS OF ONE TYPE.":
       SLEEP 1:GOSUB 710:POKE
       {SPACE}253,32:POKE 254,
       42:GOSUB 770:GOSUB 730
GF 320 CHAR 1,54,16,"THEN CHAN
       GE BACK.":SLEEP 1:GOSUB
        710:POKE 253,42:POKE 2
       54,32:GOSUB 770:GOSUB 7
       30:SLEEP 1
SQ 330 CHAR 1,10,18,"{CYN}> SA
       VE SCREENS TO DISK.":SL
       EEP 1
BQ 340 CHAR 1,10,20,"{CYN}>
       {7}OR DUMP THEM TO YOUR
        PRINTER.":SLEEP 1
XP 350 SLEEP 2:GOSUB 810:GOSUB
       730
HA 360 CHAR 1,12,11,"{PUR}'MOU
       SE' GRAPHICS IN 80 COLU
       MNS ARE NOW WITHIN YOUR
        REACH."
DA 370 GOSUB 710:X=40:Y=12:CHA
       R 1,X,Y,"{YEL}↑":TI$="0
       00000"
EC 380 EEK=JOY(1)
AK 390 GET J$:IF J$<>"" THEN 3
       90
DX 400 IF TI>150 AND TI<160 TH
       EN 650
GC 410 IF TI>300 AND TI<310 TH
       EN 660
FC 420 IF PEEK(213)=1 THEN 640
AF 430 IF EEK=128 AND X>65 AND
        Y=3 THEN 530
HH 440 IF EEK=0 THEN 500
XA 450 IF EEK=1 AND Y>3 THEN Y
       =Y-1
FP 460 IF EEK=5 AND Y<21 THEN
       {SPACE}Y=Y+1
GG 470 IF EEK=3 AND X<75 THEN
       {SPACE}X=X+1
FR 480 IF EEK=7 AND X>4 THEN X
       =X-1
PA 490 GOSUB 730
```

```
ME 500 CHAR 1,X,Y,"{YEL}↑"
CF 510 GOTO 380
AQ 520 REM * MENU GENERATOR *
HR 530 MU=1
MP 540 PRINT CHR$(142);"{CYN}"
       :SZ=19:GOSUB 680:CHAR 1
       ,57,2,CC$(1):CHAR 1,68,
       2,MENU$:FOR J=3 TO 9:CH
       AR 1,57,J,CC$(2):CHAR 1
       ,57,J+1,CC$(3):NEXT
KR 550 COLOR 5,16:PRINT CHR$(1
       4):FOR I=1 TO 3:CHAR 1,
       61,(I*2)+2,MU$(I),1:NEX
       T:COLOR5,4:CHAR 1,61,4,
       MU$(1),1:SLEEP 1
CX 560 EEK=JOY(1)
XQ 570 GET J$:IF J$<>"" THEN 5
       70
EE 580 IF EEK=5 AND MU<3 THEN
       {SPACE}MU=MU+1:COLOR 5,
       4:CHAR 1,61,(MU*2)+2,MU
       $(MU),1:COLOR 5,16:CHAR
        1,61,((MU-1)*2)+2,MU$(
       MU-1),1
AR 590 IF EEK=1 AND MU>1 THEN
       {SPACE}MU=MU-1:COLOR 5,
       4:CHAR 1,61,(MU*2)+2,MU
       $(MU),1:COLOR 5,16:CHAR
        1,61,((MU+1)*2)+2,MU$(
       MU+1),1
JM 600 IF EEK=128 AND MU=1 THE
       N SCNCLR:RESTORE:PRINT
       {SPACE}CHR$(142):GOTO 5
       0
EX 610 IF EEK=128 AND MU=2 THE
       N GOSUB 720:SLEEP 1:GOT
       O 380
QB 620 IF EEK=128 AND MU=3 THE
       N 640
HR 630 GOTO 560
JP 640 SCNCLR:PRINT CHR$(142);
       CHR$(27)+"L";"{CYN}END
       {SPACE}OF RUN... 'MAGIC
       ' ML-ROUTINE INSTALLED.
       ":END
RK 650 GOSUB 730:CHAR 1,10,13,
       "{CYN}THIS POINTER MAY
       {SPACE}BE MOVED USING A
        MOUSE OR JOYSTICK IN P
       ORT 1.":CHAR 1,36,14,"(
       TRY IT!)":GOSUB 710:GOT
       O 380
AC 660 GOSUB 730:CHAR 1,5,3,"
       {6 SPACE}PULL DOWN MENUS AND
       {SPACE}HELP SCREENS MAY
        BE CREATED LIKE THIS -
       ->":PRINT CHR$(142):CHA
       R 1,68,2,MENU$:PRINT CH
       R$(14)
XK 670 CHAR 1,5,5,"{6 SPACE}YOU CAN
       {SPACE}OPEN THE MENU BY
        PLACING THE POINTER":C
       HAR 1,5,6,"BENEATH IT A
       ND 'CLICKING'. (OR PRES
       S {RVS} RETURN {OFF} TO
        EXIT.)":GOSUB 710:GOTO
        380
DF 680 FOR S=1 TO 3:CC$(S)=LEF
       T$(BX$(S),SZ)+RIGHT$(BX
       $(S),1):NEXT:RETURN
HG 690 COLOR 5,14:CHAR 1,X+4,Y
       ,CC$(1):FOR B=1 TO 5:CH
       AR 1,X+4,Y+B,CC$(2):NEX
       T:CHAR 1,X+4,Y+B,CC$(3)
       :RETURN
JX 700 REM * SAVE SCREEN TO "F
       REE" RAM{2 SPACES}*
PA 710 SYS 2816,0,16:RETURN
SE 720 REM * RESTORE SCREEN
       {2 SPACES}*
BB 730 SYS 2816,16,0:RETURN
KA 740 REM * SWITCH ATTRIBUTES
       AFTER POKEING TO 253 &
       254 *
PK 750 SYS 2890,24,32:RETURN
CP 760 REM * SWITCH CHARACTERS
       AFTER POKEING TO 253 &
       254 *
DE 770 SYS 2890,16,24:RETURN
QH 780 REM * SWAP TO BANK 1 RA
       M *
FC 790 SYS 2970,0,AD:RETURN
JA 800 REM * FETCH FROM BANK 1
        RAM *
QJ 810 SYS 3062,16,AD:RETURN
FM 820 REM * STRING ARRAYS *
QR 830 BX$(1)="O 74 Y P"
JC 840 BX$(2)="  G {74 SPACES}
       M "
AM 850 BX$(3)="L 74 P @"
MA 860 MENU$="{CYN} *  {RVS} ME
       NU {OFF} "
PK 870 MU$(1)="  REPEAT DEMO "
EG 880 MU$(2)="  CLOSE
       {2 SPACES}MENU "
QC 890 MU$(3)="{4 SPACES}QUIT
       {SHIFT-SPACE}{4 SPACES}
       "
HX 900 RETURN
CF 910 DATA "LEARN","HOW","YOU
       ","CAN","CREATE","MULTI
       PLE","WINDOWS","IN THE"
       ,"80-COLUMN","
       {2 SPACES}MODE..."
```

DOS Plus

See instructions in article on page 70 before typing in.

```
0801:0B 08 00 CC 9E 32 31 33 B8
0809:32 00 00 00 E6 FB D0 02 FC
0811:E6 FC B1 FB 60 91 FD E6 F5
0819:FD D0 02 E6 FE 60 4C 00 1D
0821:CC 12 20 44 4F 53 2D 50 D6
0829:4C 55 53 20 43 4F 50 59 72
0831:52 49 47 48 54 20 31 39 E8
0839:38 37 20 43 4F 4D 50 55 11
0841:54 45 21 20 50 55 42 2E 7D
0849:20 00 00 00 00 00 00 00 69
0851:00 00 00 AD 03 08 85 FD 7D
0859:8D 20 08 AD 04 08 85 FE 5E
0861:8D 21 08 A0 00 A9 A9 85 0B
0869:FB A9 08 85 FC 20 0D 08 C5
0871:F0 05 20 16 08 D0 F6 20 32
0879:0D 08 F0 F6 C9 EF F0 07 96
0881:C9 FF F0 15 20 16 08 20 6F
0889:0D 08 18 6D 03 08 20 16 8A
0891:08 20 0D 08 6D 04 08 D0 2C
0899:D9 A2 00 BD 22 08 F0 06 34
08A1:20 16 E7 E8 D0 F5 4C 1F E8
08A9:08 00 4C 5A 00 A2 02 00 7B
08B1:4C EA 00 FF 1C 80 08 01 96
08B9:80 0B 40 06 24 2F 25 5E BB
08C1:2A 3F 53 51 3A 3B 5F 21 D4
08C9:46 23 3D 5C 58 53 30 3A DD
08D1:00 00 EF 19 00 EF CD 00 CC
08D9:00 EF A8 03 00 EF B7 03 5D
08E1:00 EF A9 01 00 EF 3D 02 6F
08E9:00 EF 33 02 00 EF 3A 02 B2
08F1:00 EF 29 02 00 EF 52 02 A9
08F9:00 EF 4B 01 00 EF B3 00 A6
0901:00 EF 55 02 00 EF 4A 02 30
0909:00 EF 0A 01 00 EF 6C 01 02
0911:00 EF 76 00 00 EF 63 03 77
0919:00 EF 6A 03 00 EF EE 01 43
0921:00 EF BF 00 00 EF 84 00 EF
0929:00 EF AE 00 00 EF E3 03 97
0931:00 EF E7 03 00 EF EB 03 07
0939:AD 05 03 00 CD 29 00 F0 C7
0941:4C 00 8D D9 00 AD 04 03 8A
0949:00 8D D8 00 00 AD 28 00 E0
0951:8D 04 03 00 AD 29 00 8D 2B
0959:05 03 78 00 AD 2A 00 8D 61
0961:14 03 00 AD 2B 00 8D 15 A2
0969:03 58 00 AD 0C 00 8D 86 EF
0971:02 00 AD 0E 00 8D 20 D0 62
0979:00 AD 0D 00 8D 21 D0 AD D8
0981:86 02 A0 FA 99 FF D7 99 31
0989:F9 D8 99 F3 D9 99 ED DA 2D
0991:88 D0 F1 8D 87 02 60 EE 27
0999:86 02 90 E3 00 AD D8 00 28
09A1:8D 04 03 00 AD D9 00 8D 3E
09A9:05 03 78 A9 31 8D 14 03 93
09B1:A9 EA 8D 15 03 58 60 A6 37
09B9:7A D0 06 A6 7B E0 02 F0 BC
09C1:03 4C 7C A5 AD 00 00 02 C1
09C9:00 CD 0F 00 D0 F5 00 20 AF
09D1:EA 00 68 68 6C 02 03 AD 0C
09D9:01 02 F0 25 86 BB 86 BC 4A
09E1:A2 10 00 DD 11 00 F0 05 96
09E9:CA 10 F8 30 2F 8A 0A AA E9
09F1:00 BD 2F 00 48 00 BD 2E 45
09F9:00 48 60 00 20 04 02 20 5F
0A01:59 E1 00 20 A5 01 00 AD 1B
0A09:0B 00 20 B4 FF A9 6F 85 FC
0A11:B9 20 96 FF 20 A5 FF 20 94
0A19:16 E7 C9 0D D0 F6 4C AB E2
0A21:FF C6 BB 00 AD 0B 00 20 18
0A29:B1 FF A9 6F 85 B9 20 93 29
0A31:FF A0 00 00 B1 BB F0 06 D1
0A39:20 A8 FF C8 D0 F6 4C AE BD
0A41:FF 00 20 04 02 C6 BB C6 03
0A49:BB C6 BB 10 02 C6 BC C8 D2
0A51:C8 C8 84 B7 A9 00 00 91 E6
0A59:BB A8 00 B9 22 00 F0 C8 CC
0A61:91 BB C8 D0 F6 00 20 B1 FC
0A69:02 86 C1 84 C2 00 20 B1 A8
0A71:02 86 AE 84 AF 00 20 04 08
0A79:02 20 EA F5 00 4C 11 01 A7
0A81:A9 60 85 B9 20 D5 F3 00 0F
0A89:AD 0B 00 20 B4 FF A5 B9 E3
0A91:20 96 FF A9 00 00 85 90 91
0A99:60 20 13 EE AA 20 13 EE 22
0AA1:A4 90 60 A9 20 4C 16 E7 19
0AA9:C6 BB 00 20 04 02 00 20 5A
0AB1:84 01 A0 03 84 B7 00 20 AF
0AB9:9B 01 D0 41 C6 B7 D0 F7 B8
0AC1:20 CD BD 00 20 A5 01 20 CA
0AC9:13 EE A6 90 D0 30 C9 00 DB
0AD1:00 F0 18 20 16 E7 20 E1 99
0AD9:FF F0 24 20 E4 FF F0 E8 A2
0AE1:C9 20 D0 E4 20 E4 FF F0 D0
0AE9:FB D0 DD 00 20 FF 01 A0 8F
0AF1:02 D0 C5 00 20 04 02 00 09
0AF9:20 84 01 00 20 9B 01 A8 79
0B01:00 20 77 03 20 42 F6 A9 DF
0B09:0D 4C 16 E7 A0 00 00 84 83
0B11:08 B1 BB F0 16 C9 22 F0 2B
0B19:03 C8 D0 F5 C5 08 F0 0B 97
0B21:85 08 98 65 BB 85 BB A0 71
0B29:00 00 F0 E6 84 B7 00 AD 7C
0B31:0B 00 85 BA 60 00 20 B1 1E
0B39:02 18 A9 00 00 85 0A F0 A6
0B41:25 18 A9 01 85 0A D0 1E 49
0B49:A9 C0 0C A9 80 85 0A 18 C6
0B51:A6 2B A4 2C A9 00 00 F0 1B
0B59:0E 00 20 B1 02 38 A9 00 D9
0B61:00 F0 06 38 B0 ED 38 A9 4F
0B69:01 48 A9 00 00 2A 85 93 8E
0B71:68 85 B9 D0 04 86 C3 84 A7
0B79:C4 00 20 04 02 A5 93 20 24
0B81:A2 F4 90 03 4C F9 E0 00 74
0B89:20 A5 01 00 20 77 03 A5 C3
0B91:93 D0 07 24 0A 30 0E 00 F5
0B99:4C FF 01 A2 1C A5 90 29 E1
0BA1:10 F0 F5 4C 37 A4 A5 AE C5
0BA9:85 2D A5 AF 85 2E 20 59 FB
0BB1:A6 20 33 A5 24 0A 70 06 14
0BB9:00 20 FF 01 6C 02 03 A9 03
0BC1:00 00 20 90 FF 4C AE A7 1B
0BC9:00 20 DC 02 F0 03 E6 BB C0
0BD1:60 4C 08 AF B1 BB F0 1B A0
0BD9:C9 20 F0 17 C9 47 B0 10 49
0BE1:E9 2F 30 0C C9 0A 90 0B 22
0BE9:E9 07 C9 09 90 02 D0 03 B1
0BF1:4C 48 B2 60 A0 00 00 84 26
0BF9:14 84 15 B1 BB C9 25 F0 39
0C01:1C C9 24 D0 38 C8 00 20 30
```

```
0C09:BC 02 F0 23 A2 04 06 14 95
0C11:26 15 B0 2F CA D0 F7 05 19
0C19:14 85 14 C8 D0 E9 C8 00 6B
0C21:20 BC 02 F0 0B 4A D0 1C 07
0C29:26 14 26 15 90 F1 B0 14 31
0C31:B1 BB 08 18 98 65 BB 85 EA
0C39:BB A6 14 A4 15 28 60 00 AF
0C41:20 BE 02 D0 09 4C 48 B2 23
0C49:C8 00 20 BC 02 F0 E3 B0 E1
0C51:F5 85 07 A5 15 C9 1A B0 B5
0C59:ED 85 22 A5 14 0A 26 22 9F
0C61:0A 26 22 65 14 85 14 A5 27
0C69:22 65 15 85 15 06 14 26 F5
0C71:15 B0 D3 A5 07 65 14 85 90
0C79:14 90 CE E6 15 D0 CA F0 7A
0C81:C5 00 20 DC 02 00 8E 0B 86
0C89:00 60 00 20 DC 02 AD 02 08
0C91:02 C9 25 90 07 D0 0B 00 5C
0C99:2C 0A 00 30 06 98 20 CD ED
0CA1:BD F0 0D A9 24 20 16 E7 C6
0CA9:98 00 20 92 03 8A 00 20 9D
0CB1:92 03 00 4C FF 01 48 4A 77
0CB9:4A 4A 4A 00 20 9D 03 68 B8
0CC1:29 0F 09 30 C9 3A 90 02 B0
0CC9:69 06 4C 16 E7 00 AD 2D CA
0CD1:00 48 00 AD 2C 00 48 08 D0
0CD9:48 48 48 4C 31 EA A6 C6 3F
0CE1:F0 1D A5 D4 05 D8 08 BD 15
0CE9:76 02 00 CD 10 00 F0 13 10
0CF1:28 D0 0D C9 8A B0 09 E9 A3
0CF9:84 90 05 69 10 00 20 00 70
0D01:01 4C 81 EA 28 A9 00 00 75
0D09:85 D4 85 D8 F0 F4 EE 21 B3
0D11:D0 60 EE 20 D0 60 AD 86 75
0D19:02 00 8D 0C 00 AD 20 D0 6E
0D21:00 8D 0E 00 AD 21 D0 00 F3
0D29:8D 0D 00 60 00 FF 00 00 53
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," elsewhere in this issue.

Impossible Scroll

See instructions in article on page 61 before typing in.

Program 1: Impossible Scroll

```
C000:A9 00 8D 0D C0 8D 21 D0 28
C008:85 C6 4C EB C0 20 20 20 2D
C010:20 20 20 20 20 20 20 20 91
C018:20 20 20 38 39 3A 3B 3C 9E
C020:3D 3E 3F 38 18 48 78 A8 B6
C028:D8 08 38 68 01 02 04 08 C5
C030:10 20 40 80 00 00 00 00 D1
C038:00 01 01 01 00 00 00 00 2A
C040:00 01 01 01 A9 17 8D 11 08
C048:D0 A9 2F 8D 12 D0 A9 00 82
C050:8D 21 D0 AD 02 DD 09 03 72
C058:8D 02 DD AD 00 DD 25 FC 76
C060:09 00 8D 00 DD 4C 8C C0 12
C068:A9 19 8D 11 D0 A9 F8 8D 74
C070:12 D0 A9 00 8D 21 D0 AD A4
C078:02 DD 09 03 8D 02 DD AD A1
C080:00 DD 25 FC 09 03 8D 00 5D
C088:DD 6C 0E C0 4C 81 EA AD CD
C090:19 D0 8D 19 D0 EE 0D C0 33
C098:AD 0D C0 F0 08 A9 FF 8D CF
C0A0:0D C0 4C 68 C0 4C 44 C0 69
C0A8:A2 07 BD 24 C0 9D 10 C0 94
C0B0:BD 3C C0 9D 34 C0 CA 10 5C
C0B8:F1 20 C0 C0 20 62 C1 60 CD
C0C0:A0 07 A2 0E B9 10 C0 9D B6
C0C8:00 D0 CA CA 88 10 F5 60 55
C0D0:A2 07 A0 00 BD F8 C7 D9 B4
C0D8:1B C0 F0 04 C8 4C D4 C0 58
C0E0:C8 B9 1B C0 9D F8 C7 CA CF
C0E8:10 E8 60 78 AD 14 03 8D 91
C0F0:0E C0 AD 15 03 8D 0F C0 DD
C0F8:A5 01 29 FE 85 01 A9 8F B5
C100:8D 14 03 A9 C0 8D 15 03 B3
C108:A0 00 8C 0E DC 8C 12 D0 5C
C110:C8 8C 1A D0 A9 00 85 A7 6B
C118:A9 70 85 A8 20 3D C2 A0 E3
C120:07 B9 1B C0 99 F8 C7 A9 EE
C128:01 99 27 D0 88 10 F2 A0 8F
C130:0F A9 FA 99 00 D0 88 88 7B
C138:10 F9 A9 00 8D 17 D0 20 02
C140:A8 C0 A0 0E A2 07 20 C0 6F
C148:C0 A0 00 A9 00 99 00 CE 24
C150:99 00 CF C8 D0 F7 A9 FF E0
C158:8D 15 D0 8D 1D D0 58 4C 04
C160:B2 C1 A9 00 A0 07 AA B9 13
C168:34 C0 F0 07 8A 19 2C C0 96
C170:4C 74 C1 8A 88 10 EF 8D 0A
C178:10 D0 60 A9 00 85 FE A0 93
C180:08 46 FC 90 03 18 65 FD 83
C188:4A 66 FE 88 D0 F3 85 FF 94
C190:60 A0 00 B1 A7 F0 10 85 2E
C198:02 18 A5 A7 69 01 85 A7 54
C1A0:A5 A8 69 00 85 A8 60 A9 87
C1A8:00 85 A7 A9 70 85 A8 4C 54
C1B0:91 C1 20 73 C2 A9 30 8D 53
C1B8:18 C0 20 F1 C1 20 E5 C1 B7
C1C0:CE 18 C0 D0 F5 20 A8 C0 19
C1C8:20 D0 C0 20 C0 C0 20 9F 93
C1D0:FF A5 C6 F0 DD A5 01 09 36
C1D8:01 85 01 60 A5 01 29 FE E6
C1E0:85 01 4C B2 C1 A2 02 A0 59
C1E8:00 0A 88 D0 FC CA D0 F9 BB
C1F0:60 A9 FF 8D 1A C0 A9 E8 F7
C1F8:8D 19 C0 18 AD 19 C0 6D E3
C200:18 C0 8D 19 C0 AD 1A C0 B6
C208:69 00 8D 1A C0 A0 00 AD CB
C210:19 C0 99 10 C0 AD 1A C0 38
C218:99 34 C0 18 AD 19 C0 69 CD
C220:30 8D 19 C0 AD 1A C0 69 11
C228:00 8D 1A C0 C8 C0 08 D0 8A
C230:DE AD 0D C0 10 FB 20 62 51
C238:C1 20 C0 C0 60 EA A0 00 BA
C240:A9 00 85 FC A9 D0 85 FD B4
C248:A9 00 85 FE A9 A0 85 FF 1E
C250:78 A5 01 29 FB 85 01 B1 D7
C258:FC 91 FE E6 FC E6 FE D0 61
C260:F6 E6 FF E6 FD A6 FD E0 F0
C268:E0 D0 EC A5 01 09 04 85 44
C270:01 58 60 A9 00 85 B2 20 CE
C278:91 C1 AD FF C7 85 FD A9 E6
C280:40 85 FC 20 7B C1 A5 FE 56
C288:18 65 B2 85 A9 A9 C0 65 FC
C290:FF 85 AA A9 08 85 FD A5 5F
C298:02 85 FC 20 7B C1 A5 FE 4F
C2A0:85 B0 18 A5 FF 69 A0 85 DE
C2A8:B1 A9 00 85 B3 85 FD A4 1E
C2B0:B3 B1 B0 A4 FD 91 A9 C8 2F
C2B8:C8 C8 84 FD E6 B3 A6 B3 4C
C2C0:E0 08 D0 EB A4 B2 C8 84 97
C2C8:B2 C0 03 F0 03 4C 77 C2 42
C2D0:60 78 A9 00 8D 1A D0 A9 F9
C2D8:15 8D 18 D0 AD 02 DD 09 96
C2E0:03 8D 02 DD AD 00 DD 29 BB
C2E8:FC 09 03 8D 00 DD AD 0E 49
C2F0:C0 8D 14 03 AD 0F C0 8D A5
C2F8:15 03 20 8A FF 20 5B FF AD
C300:58 60 00 00 00 00 00 00 CB
```

Program 2: Impossible Scroll—BASIC Demo

```
BE 10 REM COPYRIGHT 1987 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
HM 20 IFPEEK(49179)<>56THENLOA
      D"SCROLL.ML",8,1
HR 30 SYS49873:POKE53280,11:PO
      KE53281,0:PRINT"{CLR}"
BB 40 PRINT"{3 SPACES}{WHT}COP
      YRIGHT 1987 COMPUTE! PUB
      ., INC."
FQ 50 PRINTTAB(10)"ALL RIGHTS
      {SPACE}RESERVED{2 DOWN}
      {3}"
XA 60 PRINT"{11 SPACES}...PLEA
      SE WAIT..."
QR 70 GOSUB480
DK 80 GOSUB320
JG 90 PRINT"{UP}INTRODUCING TH
      E IMPOSSIBLE SCROLL"
AH 100 PRINT"{DOWN}PROGRAM. JU
      ST WATCH THE SCROLLING"
DH 110 PRINT"{DOWN}MESSAGE AT
      {SPACE}THE BOTTOM. NOTE
       HOW IT"
JF 120 PRINT"{DOWN}IS BELOW TH
      E NORMAL DATA AREA, AWA
      Y"
GQ 130 PRINT"{DOWN}FROM INTERF
      ERING WITH A TEXT DISPL
      AY."
DJ 140 GOSUB430
SS 150 SYS49152
JC 160 GETA$
QS 170 PRINT"{CLR}{3 DOWN}{6}T
      HE SCROLLING MESSAGE CA
      N BE ENLARGED"
FR 180 POKE53271,255
MM 190 PRINT"{DOWN}BY CHANGING
       THE PROGRAM, OR BY SET
      TING"
QK 200 PRINT"{DOWN}THE SPRITE
      {SPACE}Y-EXPANSION."
EQ 210 GOSUB430
KQ 220 SYS49628:GETA$
QM 230 POKE53271,170
HH 240 PRINT"{9 DOWN}{7}OR HOW
       ABOUT 'UP AND DOWN SCR
      OLL'?":SYS49628
CP 250 PRINT"{CLR}{7}{8 DOWN}
      {3 SPACES}...OR COLOR C
      HANGES TO THE SCREEN?"
JC 260 FORA=0TO240:POKE49267,A
      :NEXT:POKE198,0
HJ 270 PRINT"{CLR}{3 DOWN}{7}
      {4 SPACES}PRESS ANY KEY
       TO START DEMO OVER"
QS 280 POKE53269,0
RG 290 POKE53280,RND(1)*15:GET
      A$:ON-(A$="")GOTO290:RU
      N
HJ 300 END
CR 310 REM POKE IN MESSAGE FRO
      M DATA
HA 320 I=7*4096
AQ 330 READ X$:IF X$="END" THE
      N POKE I,0:RETURN
AD 340 FORZ=1TOLEN(X$):G=ASC(M
      ID$(X$,Z,1)):IFG>=64AND
      G<=95THENG=G-64:GOTO360
PM 350 IFG>95THENG=INT(G-128)
FM 360 POKEI,G:I=I+1:NEXT:GOTO
      330
SP 370 REM DATA FOR MESSAGE
JC 380 DATA"THIS IS THE SCROLL
       PROGRAM WHICH DEFIES T
      HE NORMAL PHYSICS OF TH
      E"
MP 390 DATA" VIC-II CHIP...
      {4 SPACES}BY USING RAST
      ER INTERRUPTS, THE PROG
      RAM TRICKS "
JD 400 DATA"THE COMPUTER INTO
      {SPACE}DISPLAYING SPRIT
      ES BELOW THE BORDER. TH
      IS "
MG 410 DATA"ENABLES THE USER T
      O SCROLL MESSAGES IN TH
      E AREA WHERE DATA USUAL
      LY "
RM 420 DATA"DOESN'T BELONG!
```

```
        {3 SPACES}","END"
MH 430  PRINT"{HOME}{19 DOWN}
        {WHT}";:FORA=1TO40:PRIN
        T"-";:NEXT
KQ 440  PRINT"{YEL}{7 SPACES}PR
        ESS ANY KEY TO SEE MORE
        "
PM 450  FORA=1TO40:PRINT"{WHT}-
        ";:NEXT:PRINT"{HOME}":R
        ETURN
KC 460  END
DH 470  REM LOAD A CHARACTER SE
        T
KK 480  RETURN: <--------REM ERA
        SE THIS LINE TO LOAD CU
        STOMIZED CHARACTERS
KR 490  POKE49725,96 :REM TURN
        {SPACE}OFF COPY SUBROUT
        INE (POKE49725,234 TO R
        ESTORE COPY)
SM 500  POKE184,2:POKE185,0:POK
        E186,8:REM POKE 186,1 F
        OR DATASSETTE
PQ 510  F$="CHARSET":REM THE NA
        ME OF THE CHARACTER SET
DK 520  POKE183,LEN(F$):POKE187
        ,0:POKE188,2:FORI=1TOLE
        N(F$)
MH 530  POKE511+I,ASC(MID$(F$,I
        ,1)):NEXT
PX 540  POKE780,0:POKE781,0:POK
        E782,160:SYS65493
AJ 550  RETURN
```

Screen Maker

See instructions in article on page 35 before typing in.

```
C000:78 A9 81 8D 19 D0 A9 01 91
C008:8D 1A D0 A9 1B 8D 11 D0 8D
C010:A9 BA 8D 12 D0 A9 7F 8D A1
C018:0D DC A9 09 8D A7 02 A9 D5
C020:01 8D AF 02 A9 C0 8D 15 1C
C028:03 A9 84 8D 14 03 A9 04 03
C030:85 8C A9 00 8D A8 02 85 65
C038:8B 8D AB 02 8D AC 02 8D 29
C040:AD 02 A9 0B 8D 20 D0 8D 1B
C048:E8 07 A9 18 8D 00 D0 A9 6E
C050:32 8D 01 D0 A9 20 8D 00 64
C058:20 20 03 CB 20 0E C3 A9 79
C060:30 8D F8 07 8D F8 23 8D 11
C068:21 D0 8D E9 07 A9 01 8D 6D
C070:15 D0 A9 93 20 D2 FF 20 8B
C078:57 C7 20 76 C7 58 20 C0 A3
C080:C0 4C 7E C0 A9 01 8D 19 D6
C088:D0 AD A8 02 49 FF 8D A8 21
C090:02 F0 18 A9 85 8D 18 D0 50
C098:AD 21 D0 85 02 A9 00 8D EF
C0A0:12 D0 8D 21 D0 20 20 C7 32
C0A8:4C 31 EA A9 15 8D 18 D0 74
C0B0:A5 02 8D 21 D0 A9 BA 8D 79
C0B8:12 D0 20 20 C7 4C 31 EA 3A
C0C0:AD 01 DC 4A B0 20 08 48 F7
C0C8:AD AB 02 F0 0C 20 28 C2 4F
C0D0:20 74 C2 CE AB 02 4C E4 A7
C0D8:C0 AD AD 02 F0 06 20 7D 59
C0E0:C1 CE AD 02 68 28 4A B0 F5
C0E8:24 08 48 AD AB 02 C9 18 73
C0F0:F0 0C 20 34 C2 20 80 C2 8F
C0F8:EE AB 02 4C 0B C1 AD AD 4A
C100:02 C9 08 F0 06 20 40 C1 F9
C108:EE AD 02 68 28 4A B0 12 13
C110:08 48 AD AC 02 F0 09 20 30
C118:40 C2 20 8C C2 CE AC 02 E5
C120:68 28 4A B0 14 08 48 AD 35
C128:AC 02 C9 27 F0 09 20 5B 75
C130:C2 20 98 C2 EE AC 02 68 F2
C138:28 4A B0 03 20 A4 C2 60 22
C140:20 F9 C6 A9 03 85 3A A9 12
C148:FF 85 39 A9 04 85 FC A9 C8
C150:27 85 FB A9 07 85 8E A9 F7
C158:C0 85 8D 20 BA C1 A9 D7 59
C160:85 3A A9 FF 85 39 A9 D8 A7
C168:85 FC A9 27 85 FB A9 DB E0
C170:85 8E A9 C0 85 8D 20 BA F8
C178:C1 20 F9 C6 60 20 F9 C6 CE
C180:A9 07 85 3A A9 BF 85 39 7F
C188:A9 07 85 FC A9 97 85 FB D5
C190:A9 04 85 8E A9 00 85 8D 69
C198:20 F1 C1 A9 DB 85 3A A9 8E
C1A0:BF 85 39 A9 DB 85 FC A9 BF
C1A8:97 85 FB A9 D8 85 8E A9 17
C1B0:00 85 8D 20 F1 C1 20 F9 1A
C1B8:C6 60 A2 19 A0 28 B1 39 DF
C1C0:48 88 D0 FA A0 28 B1 FB 59
C1C8:91 39 88 D0 F9 18 A5 39 36
C1D0:69 28 85 39 90 03 E6 3A EF
C1D8:18 A5 FB 69 28 85 FB 90 C7
C1E0:02 E6 FC CA D0 DE A0 00 AE
C1E8:68 91 8D C8 C0 28 D0 F8 84
C1F0:60 A2 19 A0 28 B1 39 48 3D
C1F8:88 D0 FA A0 28 B1 FB 91 EF
C200:39 88 D0 F9 38 A5 39 E9 B2
C208:28 85 39 B0 03 C6 3A 38 15
C210:A5 FB E9 28 85 FB B0 02 A6
C218:C6 FC CA D0 DE A0 00 68 88
C220:91 8D C8 C0 28 D0 F8 60 CD
C228:A2 08 20 DC C6 CE 01 D0 17
C230:CA D0 F7 60 A2 08 20 DC A6
C238:C6 EE 01 D0 CA D0 F7 60 F3
C240:A2 08 20 DC C6 CE 00 D0 2D
C248:AD 00 D0 C9 FF D0 08 AD 5C
C250:10 D0 49 01 8D 10 D0 CA 64
C258:D0 E8 60 A2 08 20 DC C6 F7
C260:EE 00 D0 AD 00 D0 D0 08 3F
C268:AD 10 D0 49 01 8D 10 D0 A6
C270:CA D0 EA 60 38 A5 8B E9 4C
C278:28 85 8B B0 02 C6 8C 60 94
C280:18 A5 8B 69 28 85 8B 90 82
C288:02 E6 8C 60 38 A5 8B E9 B9
C290:01 85 8B B0 02 C6 8C 60 19
C298:18 A5 8B 69 01 85 8B 90 61
C2A0:02 E6 8C 60 AD AB 02 C9 62
C2A8:11 90 03 4C C6 C2 AD AE 4B
C2B0:02 A0 00 91 8B A5 8B 85 08
C2B8:FD 18 A5 8C 69 D4 85 FE 69
C2C0:AD AF 02 91 FD 60 AD AC DB
C2C8:02 C9 08 B0 26 C9 06 B0 E2
C2D0:25 AD AB 02 C9 11 F0 21 7F
C2D8:C9 12 F0 20 C9 13 F0 1F 83
C2E0:C9 14 F0 1E C9 15 F0 1D F1
C2E8:C9 16 F0 1C C9 17 F0 1B 60
C2F0:4C B7 C3 4C 0E C3 4C 42 22
C2F8:C7 4C 7A C3 4C 5C C3 4C A8
C300:11 C5 4C C6 C4 4C 6C C4 6C
C308:4C 5B C5 4C 44 C6 A0 00 88
C310:A5 8B 85 FD 18 A5 8C 69 B7
C318:1C 85 FE B1 FD 8D AE 02 8F
C320:78 A5 01 29 FB 85 01 AD A5
C328:AE 02 85 3B A9 00 85 3C 80
C330:06 3B 26 3C 06 3B 26 3C B7
C338:06 3B 26 3C 18 A5 3C 69 53
C340:D0 85 3C A2 00 A0 00 B1 77
C348:3B 9D 00 0C E8 E8 E8 C8 1B
C350:C0 08 90 F3 A5 01 09 04 D2
C358:85 01 58 60 AD AC 02 C9 E1
C360:03 B0 09 EE 20 D0 EE E8 B0
C368:07 4C 63 C4 AD 18 D0 30 DE
C370:FB EE 21 D0 EE E9 07 4C 5C
C378:63 C4 AD AC 02 D0 0E CE A1
C380:A7 02 AD A7 02 C9 02 D0 98
C388:16 EE A7 02 60 C9 02 D0 EA
C390:23 EE A7 02 AD A7 02 C9 54
C398:0A D0 04 CE A7 02 60 18 E4
C3A0:A2 11 A0 04 A9 20 8D 88 83
C3A8:02 20 F0 FF A9 00 AE A7 A9
C3B0:02 20 CD BD 4C 63 C4 78 C8
C3B8:20 F9 C6 CE 15 D0 AD AC 88
C3C0:02 C9 03 90 16 A9 15 8D 34
C3C8:18 D0 AD E9 07 8D 21 D0 66
C3D0:20 FB CA 20 F9 C6 EE 15 A0
C3D8:D0 58 60 A9 08 8D 88 02 0F
C3E0:A9 25 8D 18 D0 A9 31 8D D6
C3E8:14 03 A9 EA 8D 15 03 A9 8F
C3F0:00 8D 1A D0 8D 21 D0 58 17
C3F8:20 71 CA A9 F0 A0 C8 20 9C
C400:1E AB 20 FB CA 20 EE C6 C2
C408:AD 01 DC C9 FF F0 F9 20 B8
C410:EE C6 C9 EF F0 3A C9 FD FC
C418:D0 EE 20 EE C6 AD 01 DC 84
C420:C9 FD F0 F9 20 EE C6 20 36
C428:71 CA 20 F9 C6 EE 15 D0 AD
C430:78 A9 84 8D 14 03 A9 C0 8A
C438:8D 15 03 A9 7F 8D 0D DC F1
C440:AD E9 07 8D 21 D0 A9 01 75
C448:8D 1A D0 8D 15 D0 58 60 0F
C450:A9 04 8D 88 02 A9 93 20 E7
C458:D2 FF 20 71 CA 20 F9 C6 F7
C460:EE 15 D0 20 FB CA 20 EE FC
C468:C6 4C 30 C4 AD AC 02 C9 A8
C470:04 B0 04 20 B5 C2 60 20 44
C478:F9 C6 A9 D8 85 FC A9 00 E6
C480:85 FB A2 03 A0 04 B9 8F 68
C488:52 29 0F 99 8F 52 88 D0 A8
C490:F5 B1 FB 29 0F CD 90 52 B6
C498:D0 0A AD 91 52 29 0F 91 C2
C4A0:FB 4C B0 C4 CD 92 52 D0 CB
C4A8:07 AD 93 52 29 0F 91 FB 5D
C4B0:88 D0 DE 8A F0 0A E6 FC B1
C4B8:CA D0 D6 A0 E8 4C 91 C4 21
C4C0:20 F9 C6 4C 63 C4 AD AC AC
C4C8:02 C9 04 B0 0E A5 8B 85 F4
C4D0:FD A9 23 85 FE AD AE 02 8E
C4D8:91 FD 60 A9 04 85 FC A9 2B
C4E0:00 85 FB A2 03 A0 00 B1 C1
C4E8:FB CD 20 23 D0 08 AD 21 3D
C4F0:23 91 FB 4C 00 C5 CD 22 89
C4F8:23 D0 05 AD 23 23 91 FB 88
C500:88 D0 E4 8A F0 0A E6 FC C3
C508:CA D0 DC A0 E8 4C E7 C4 DF
C510:60 20 F9 C6 20 20 C5 20 AC
C518:2B C5 20 F9 C6 4C 63 C4 41
C520:A9 03 85 FE A9 FF 85 FD 38
C528:4C 33 C5 A9 D7 85 FE A9 76
C530:FF 85 FD A2 19 A0 28 B1 54
C538:FD 48 88 D0 FA A0 28 68 06
C540:91 FD A0 01 68 91 FD C8 86
C548:C0 28 90 F8 18 A5 FD 69 9C
C550:28 85 FD 90 02 E6 FE CA 8E
C558:D0 DB 60 78 A9 31 8D 14 18
C560:03 A9 EA 8D 15 03 A9 FF 16
C568:8D 0D DC A9 00 8D 1A D0 6F
C570:8D 15 D0 8D 21 D0 85 3E 90
C578:58 20 F9 C6 20 71 CA A9 E9
C580:08 8D 88 02 A9 25 8D 18 B9
C588:D0 20 13 C9 AD AC 02 C9 71
C590:03 90 52 A9 49 A0 C9 20 27
C598:1E AB 20 CB C9 AD B3 02 4D
C5A0:F0 2E A2 61 A0 CA 20 BD C8
C5A8:FF A9 01 AE B1 02 A8 20 B0
C5B0:BA FF A9 00 20 D5 FF 20 47
C5B8:13 CA A5 90 30 12 AD 61 C4
C5C0:CA C9 5E F0 08 A9 5E 8D 30
C5C8:61 CA 4C 9D C5 20 13 CA BA
C5D0:20 71 CA 20 F9 C6 AD E8 53
C5D8:07 8D 20 D0 AD E9 07 8D 0D
C5E0:21 D0 4C 30 C4 A9 98 A0 5C
C5E8:C9 20 1E AB 20 CB C9 A9 4D
C5F0:04 8D B4 02 A9 07 8D B2 CF
C5F8:02 AD B3 02 F0 D2 A2 61 01
C600:A0 CA 20 BD FF A9 01 AE C7
C608:B1 02 A8 20 BA FF A9 00 2F
C610:85 FD AD B4 02 85 FE A2 A7
C618:EA AC B2 02 A9 FD 20 D8 1B
C620:FF 20 13 CA A5 90 30 A8 3D
C628:AD 61 CA C9 5E F0 12 A9 5F
C630:CC 8D B4 02 A9 CF 8D B2 98
C638:02 A9 5E 8D 61 CA 4C F9 9E
C640:C5 4C CD C5 A9 00 85 3D 6F
C648:85 FD 85 B8 85 B9 20 CC 74
C650:FF 20 9E CA CE 15 D0 A9 7C
C658:0B 8D 11 D0 A2 06 20 C9 35
C660:FF A9 16 20 D2 FF A5 90 8F
C668:30 63 20 F9 C6 A2 04 86 D9
C670:FE 20 C9 FF A0 FF A2 19 22
C678:C8 B1 FD 10 06 20 BB CA 8A
C680:4C 92 C6 48 A5 3D F0 09 43
C688:A9 00 85 3D A9 92 20 D2 1A
C690:FF 68 C9 20 B0 03 4C A7 45
C698:C6 C9 40 90 0D C9 60 B0 0E
C6A0:06 18 69 20 4C AA C6 18 19
```

```
C6A8:69 40 20 D2 FF C0 27 90 0E
C6B0:C7 A9 0D 20 D2 FF A9 00 1A
C6B8:85 3D 18 A5 FD 69 28 85 21
C6C0:FD 90 02 E6 FE A0 FF CA 65
C6C8:D0 AE 20 F9 C6 20 CC FF 5E
C6D0:20 E7 FF EE 15 D0 A9 1B B1
C6D8:8D 11 D0 60 AD A7 02 48 E9
C6E0:A8 88 D0 FD CE A7 02 D0 C8
C6E8:F8 68 8D A7 02 60 A2 00 10
C6F0:A0 19 CA D0 FD 88 D0 FA 2A
C6F8:60 A0 00 B9 A8 DA 48 B9 75
C700:F0 51 99 A8 DA 68 99 F0 B6
C708:51 C8 D0 EF A0 40 B9 A7 AC
C710:DB 48 B9 EF 52 99 A7 DB F9
C718:68 99 EF 52 88 D0 EF 60 2D
C720:CE 27 D0 CE A9 02 D0 19 F7
C728:A2 00 A0 00 A9 14 8D A9 7F
C730:02 BD 00 0C 49 FF 9D 00 76
C738:0C E8 E8 E8 C8 C0 08 90 9D
C740:F0 60 A0 00 A5 8B 85 FD D8
C748:18 A5 8C 69 D4 85 FE B1 E1
C750:FD 8D AF 02 4C 63 C4 A9 7B
C758:A8 85 FD A9 22 85 FE A0 BD
C760:00 B9 AD C7 91 FD C8 D0 77
C768:F8 E6 FE B9 AD C8 91 FD 5B
C770:C8 C0 40 90 F6 60 A0 00 20
C778:A9 DA 85 FE A9 0C 91 FD D2
C780:C8 D0 FB E6 FE 91 FD C8 99
C788:C0 40 90 F9 A2 00 A9 AD 50
C790:85 FD C6 FE A0 02 8A 91 DE
C798:FD E8 88 D0 F9 18 A5 FD F8
C7A0:69 28 85 FD 90 02 E6 FE D8
C7A8:E0 10 90 E8 60 AB A0 AD ED
C7B0:A0 B9 A0 A0 A0 00 01 02 26
C7B8:03 04 05 06 07 08 09 0A 40
C7C0:0B 0C 0D 0E 0F 10 11 12 48
C7C8:13 14 15 16 17 18 19 1A 50
C7D0:30 31 32 33 34 82 8F 92 9B
C7D8:82 87 92 A0 A0 80 81 82 74
C7E0:83 84 85 86 87 88 89 8A 68
C7E8:8B 8C 8D 8E 8F 90 91 92 70
C7F0:93 94 95 96 97 98 99 9A 78
C7F8:B0 B1 B2 B3 B4 93 83 92 6C
C800:8F 8C 8C A0 A0 1B 1C 1D DE
C808:1E 1F 21 22 23 24 25 26 D0
C810:27 28 29 2A 2B 2D 2C 3B A8
C818:3A 2E 2F 3C 3E 3D 3F 20 81
C820:35 36 37 38 39 A0 A0 A0 72
C828:A0 84 8F A0 A0 9B 9C 9D 71
C830:9E 9F A1 A2 A3 A4 A5 A6 F8
C838:A7 A8 A9 AA AB AD AC BB D0
C840:BA AE AF BC BE BD BF A0 A9
C848:B5 B6 B7 B8 B9 51 51 51 EB
C850:51 84 8F A0 A0 46 40 44 8A
C858:45 47 42 48 55 49 4A 4B DA
C860:4C 4F 50 7A 4E 4D 6B 73 8F
C868:71 72 70 7D 6D 6E 64 6F 92
C870:79 62 F8 F7 E3 93 96 A0 31
C878:A0 8C 84 A0 A0 C6 C0 C4 7E
C880:C5 C7 C2 C8 D5 C9 CA CB 03
C888:CC CF D0 FA CE CD EB F3 B7
C890:F1 F2 F0 FD ED EE E4 EF BA
C898:F9 E2 78 77 63 90 92 89 72
C8A0:8E 94 93 A0 A0 5B 56 57 91
C8A8:41 58 5A 53 7E 7B 6C 7C A8
C8B0:69 5F 5C 68 51 7F 65 74 A8
C8B8:75 61 EA E7 5F 66 03 0F E2
C8C0:0D 10 15 14 05 83 8C 92 A2
C8C8:88 8D 85 A0 A0 DB D6 D7 B6
C8D0:C1 D8 DA D3 FE FB EC FC D0
C8D8:E9 DF DC EA D1 FF E5 F4 F0
C8E0:F5 E1 6A 67 DF E6 07 01 53
C8E8:1A 05 14 14 05 00 00 00 B4
C8F0:93 11 12 46 49 52 45 92 E7
C8F8:20 54 4F 20 43 4C 45 41 B2
C900:52 2C 12 44 4F 57 4E 92 55
C908:20 54 4F 20 41 42 4F 52 B0
C910:54 20 00 A9 08 8D B1 02 4C
C918:A9 32 A0 C9 20 1E AB 20 AE
C920:E4 FF F0 FB C9 44 F0 09 4E
C928:C9 54 D0 F3 A9 01 8D B1 2D
C930:02 60 93 11 11 54 41 50 0D
C938:45 20 4F 52 20 44 49 53 7D
C940:4B 20 28 54 2F 44 29 20 C8
C948:00 93 11 11 4C 4F 41 44 5A
C950:20 45 52 41 53 45 53 20 1A
C958:43 55 52 52 45 4E 54 20 7E
C960:53 43 52 45 45 4E 20 0D BD
C968:11 50 52 45 53 53 20 3C 9B
C970:52 45 54 55 52 4E 3E 20 C6
C978:54 4F 20 41 42 4F 52 54 6A
C980:20 0D 11 46 49 4C 45 4E 42
C988:41 4D 45 20 54 4F 20 4C 27
C990:4F 41 44 20 3F 20 20 00 61
C998:93 11 11 50 52 45 53 53 03
C9A0:20 3C 52 45 54 55 52 4E DC
C9A8:3E 20 54 4F 20 41 42 4F BC
C9B0:52 54 20 20 0D 11 46 49 0B
C9B8:4C 45 4E 41 4D 45 20 54 B5
C9C0:4F 20 53 41 56 45 20 3F C9
C9C8:20 20 00 A9 00 85 FD 85 A6
C9D0:CC 20 E4 FF F0 F9 C9 5F D1
C9D8:B0 F5 C9 0D F0 26 C9 14 14
C9E0:D0 0E A5 FD F0 E9 A9 14 8B
C9E8:C6 FD 20 D2 FF 4C CF C9 2B
C9F0:C9 30 90 DB 20 D2 FF A6 38
C9F8:FD 9D 61 CA E6 FD A5 FD 44
CA00:C9 10 90 CB A5 FD 8D B3 41
CA08:02 A9 01 85 CC A9 0D 20 C8
CA10:D2 FF 60 AD B1 02 C9 08 27
CA18:D0 46 A9 00 85 B7 A9 0F 4A
CA20:85 B8 85 B9 A9 08 85 BA 26
CA28:20 C1 E1 20 CC FF A2 0F 37
CA30:20 C6 FF A9 0D 20 D2 FF B0
CA38:20 CF FF C9 30 F0 19 20 06
CA40:D2 FF 20 CF FF 20 D2 FF 66
CA48:C9 0D F0 03 4C 42 CA 20 75
CA50:D2 FF 20 58 CA 4C CB CA C2
CA58:20 CC FF A9 0F 20 C3 FF 4C
CA60:60 00 00 00 00 00 00 00 26
CA68:00 00 00 00 00 00 00 00 FD
CA70:00 A2 04 A0 00 A9 D8 85 17
CA78:FE A9 CC 85 FC 84 FB 84 60
CA80:FD AD 90 CA 48 AD 92 CA 28
CA88:8D 90 CA 68 8D 92 CA B1 E6
CA90:FB 91 FD 88 D0 F9 E6 FC 0A
CA98:E6 FE CA D0 F2 60 A9 04 38
CAA0:85 B8 85 BA A9 00 85 B7 93
CAA8:20 C1 E1 20 CC FF A9 06 BC
CAB0:85 B8 85 B9 20 C1 E1 20 6F
CAB8:CC FF 60 48 A5 3D D0 07 10
CAC0:A9 12 85 3D 20 D2 FF 68 E8
CAC8:29 7F 60 A9 D8 A0 CA 20 78
CAD0:1E AB 20 E4 FF F0 FB 60 CE
CAD8:0D 11 20 50 52 45 53 53 E3
CAE0:20 3C 53 50 41 43 45 20 C6
CAE8:42 41 52 3E 20 54 4F 20 2F
CAF0:43 4F 4E 54 49 4E 55 45 7E
CAF8:20 0D 00 AD 01 DC C9 EF BB
CB00:F0 F9 60 A0 41 A9 00 99 EE
CB08:FF 0B 88 D0 FA 60 00 00 D9
```

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," elsewhere in this issue.

Screen Dump Set For The 128

Article on page 74.

Program 1: ML DATA

```
BE 10 REM COPYRIGHT 1987 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
DE 20 PRINT"{CLR}{3 SPACES}COP
      YRIGHT 1987 COMPUTE! PUB
      ., INC."
RD 30 PRINTTAB(10)"ALL RIGHTS
      {SPACE}RESERVED"
PS 40 FORI=0TO121:READA:CK=CK+
      A:POKE4864+I,A:NEXT
FH 50 IFCK<>16620THENPRINT"ERR
      OR IN DATA STATEMENTS":S
      TOP
EB 60 BSAVE"SCREENDUMP.ML",P48
      64TOP4986
DD 70 DATA 133,250,134,251,169
      ,0,192,0
BM 80 DATA 240,5,56,42,136,208
      ,251,141
BF 90 DATA 122,19,160,3,169,25
      0,162,1
CS 100 DATA 136,32,116,255,153
      ,252,0,192
MM 110 DATA 0,208,241,164,252,
      136,136,136
CX 120 DATA 136,132,252,164,25
      2,169,253,162
KD 130 DATA 1,136,32,116,255,1
      53,124,19
RD 140 DATA 192,0,208,241,164,
      252,136,185
AG 150 DATA 124,19,208,6,192,0
      ,208,246
AH 160 DATA 240,45,200,132,252
      ,136,185,124
MF 170 DATA 19,13,122,19,77,12
      2,19,74
JH 180 DATA 24,105,128,153,124
      ,19,192,0
XJ 190 DATA 208,235,164,252,16
      9,253,141,185
GK 200 DATA 2,136,185,124,19,1
      62,1,32
MD 210 DATA 119,255,192,0,208,
      238,96,132
BR 220 DATA 252,96
```

Program 2: 128 Screen Dump

```
BE 10 REM COPYRIGHT 1987 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
DE 20 PRINT"{CLR}{3 SPACES}COP
      YRIGHT 1987 COMPUTE! PUB
      ., INC."
XG 30 PRINTTAB(10)"ALL RIGHTS
      {SPACE}RESERVED":SLEEP3
QD 40 GRAPHIC1,0:GRAPHIC0,1
SP 50 COLOR0,4:COLOR4,4:COLOR5
      ,1
HJ 60 PRINT"{10 DOWN}
      {13 SPACES}128 SCREEN DU
      MP"
QD 70 BLOAD"SCREENDUMP.ML"
KS 80 PRINT"{6 DOWN}{5 SPACES}
      SCREEN WILL BLANK DURING
       PRINTING"
JJ 90 INPUT"{2 DOWN}{5 SPACES}
      PICTURE NAME";P$:IFP$=""
      THEN140
GE 100 PRINT"{DOWN}{5 SPACES}I
      NSERT PICTURE DISK"
FA 110 PRINT"{5 SPACES}THEN PR
      ESS ANY KEY"
CG 120 GETKEYZ$
XX 130 BLOAD(P$)
JF 140 FAST
HK 150 OPEN4,4:PRINT#4,CHR$(8)
QR 160 A$="":P=POINTER(A$):X=I
      NT(P/256):A=P-256*X
KS 170 FORI=45TO0STEP-1
QA 180 SSHAPEA$,7*I,0,7*I+6,19
      9
JB 190 SYS4864,A,X
GC 200 IFPEEK(252)=0THENA$="":
      ELSEA$=LEFT$(A$,PEEK(25
      2))
MF 210 PRINT#4,A$
```

```
HS 220 NEXT
PF 230 PRINT#4,CHR$(15)
BP 240 CLOSE4
AC 250 SLOW
```

Program 3: 128 Dual Dump

```
BE 10 REM COPYRIGHT 1987 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
DE 20 PRINT"{CLR}{3 SPACES}COP
      YRIGHT 1987 COMPUTE! PUB
      ., INC."
XG 30 PRINTTAB(10)"ALL RIGHTS
      {SPACE}RESERVED":SLEEP3
HG 40 GRAPHIC1,1:GRAPHIC0
SP 50 COLOR0,4:COLOR4,4:COLOR5
      ,1
KJ 60 PRINT"{CLR}{10 DOWN}
      {5 SPACES}DUAL DUMP"
QD 70 BLOAD"SCREENDUMP.ML"
MS 80 PRINT"{2 DOWN}{5 SPACES}
      SCREEN WILL BLANK DURING
       PRINTING"
SX 90 PRINT"{DOWN}{5 SPACES}IN
      SERT PICTURE DISK"
KA 100 PRINT"{5 SPACES}THEN PR
      ESS ANY KEY"
GH 110 GETKEYZ$
DX 120 OPEN4,4:PRINT#4,CHR$(8)
AX 130 A$="":P=POINTER(A$):X=I
      NT(P/256):A=P-256*X
XG 140 DIMB$(45,1),C$(1):PRINT
GD 150 FORI=1TO2:PRINT"
      {5 SPACES}PICTURE #";I;
      :INPUTC$(I-1):NEXT
CR 160 INPUT"{DOWN}{5 SPACES}T
      OUCHING OR SPACED (T/S)
      ";S$:S=200:IFS$="S"THEN
      S=240
QH 170 FAST
EE 180 FORI=0TO1:BLOAD(C$(I))
GQ 190 FORJ=45TO0STEP-1
FR 200 SSHAPEA$,7*J,0,7*J+6,19
      9
RB 210 SYS4864,A,X
SA 220 IFPEEK(252)=0THENA$="":
      ELSEA$=LEFT$(A$,PEEK(25
      2))
KR 230 B$(J,I)=A$
JS 240 NEXT:NEXT
HB 250 FORI=45TO0STEP-1
PM 260 IFB$(I,0)=""ANDB$(I,1)=
      ""THENPRINT#4:ELSEPRINT
      #4,B$(I,0)CHR$(27)CHR$(
      16)CHR$(0)CHR$(S)B$(I,1
      )
CC 270 NEXT
HJ 280 PRINT#4,CHR$(15)
FX 290 CLOSE4
PF 300 SLOW
```

Program 4: 128 Window Dump

```
BE 10 REM COPYRIGHT 1987 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
DE 20 PRINT"{CLR}{3 SPACES}COP
      YRIGHT 1987 COMPUTE! PUB
      ., INC."
XG 30 PRINTTAB(10)"ALL RIGHTS
      {SPACE}RESERVED":SLEEP3
PG 40 GRAPHIC1,0:GRAPHIC0
SP 50 COLOR0,4:COLOR4,4:COLOR5
      ,1
EB 60 PRINT"{CLR}{2 DOWN}
      {5 SPACES}WINDOW DUMP"
QD 70 BLOAD"SCREENDUMP.ML"
CP 80 GOSUB630
PB 90 PRINT"{2 DOWN}{5 SPACES}
      7{2 SPACES}8{2 SPACES}9"
JH 100 PRINT"{6 SPACES}M B N"
HG 110 PRINT"{5 SPACES}4 C C 6
      "
EB 120 PRINT"{6 SPACES}N B M"
BA 130 PRINT"{5 SPACES}1
      {2 SPACES}2{2 SPACES}3"
KQ 140 PRINT"{DOWN}{5 SPACES}U
      SE KEYPAD TO LOCATE COR
      NER"
QR 150 PRINT"{5 SPACES}THEN PR
      ESS [ENTER] TO SET"
RS 160 PRINT"{DOWN}{5 SPACES}S
      CREEN WILL BLANK DURING
       PRINTING"
KP 170 INPUT"{DOWN}{5 SPACES}P
      ICTURE NAME";P$:IFP$=""
      THEN220
HM 180 PRINT"{DOWN}{5 SPACES}I
      NSERT PICTURE DISK"
FG 190 PRINT"{5 SPACES}THEN PR
      ESS ANY KEY"
XM 200 GETKEYZ$
KC 210 BLOAD(P$)
FF 220 OPEN4,4:PRINT#4,CHR$(8)
GH 230 A$="":P=POINTER(A$):X=I
      NT(P/256):A=P-X*256:XX=
      1
SD 240 GRAPHIC2,0,23
CH 250 XP=0:YP=31
GB 260 SPRITE1,1,XX:SPRITE2,1,
      XX
QG 270 XS=88:YS=91
FS 280 MOVSPR1,100,100:MOVSPR2
      ,100,100
JM 290 PRINT"{6 DOWN}SELECT UP
      PER LEFT CORNER"
RR 300 SP=1$:GOSUB490:X1=XP:Y1=
      YP-31
PP 310 PRINT:PRINT"SELECT LOWE
      R RIGHT CORNER"
PD 320 SP=2:MOVSPR2,X1+12,Y1+4
      1:GOSUB490:X2=XP:Y2=YP-
      31
HA 330 FAST
FH 340 X3=X2-X1
FF 350 X4=INT(X3/7)
EG 360 X5=X3-X4*7
GF 370 Y=7-X5
JE 380 IFY=0THENX4=X4-1
HQ 390 FORI=X4TO0STEP-1
AC 400 SSHAPEA$,I*7+X1,Y1,I*7+
      6+X1,Y2
HR 410 SYS4864,A,X,Y
HJ 420 Y=0
FD 430 IFPEEK(252)=0THENA$="":
      ELSEA$=LEFT$(A$,PEEK(25
      2))
PC 440 PRINT#4,A$
ER 450 NEXT
EH 460 PRINT#4,CHR$(15)
BA 470 SLOW
BE 480 END
SP 490 DO
AF 500 GETP$:IFP$=""THENXX=3-X
      X:SPRITE1,1,XX:SPRITE2,
      1,XX:GOTO500
CR 510 P=VAL(P$)
BR 520 IFP=0THENEXIT
MS 530 IFP>6THENYS=YS-1:ELSEIF
      P<4THENYS=YS+1
FX 540 IFP/3=INT(P/3)THENXS=XS
      +1
GM 550 P=P+2:IFP/3=INT(P/3)THE
      NXS=XS-1
GR 560 IFXS<XPTHENXS=XP:ELSEIF
      XS>319THENXS=319
QM 570 IFYS<YPTHENYS=YP:ELSEIF
      YS>230THENYS=230
AJ 580 MOVSPRSP,XS+12,YS+10
AE 590 LOOP
MK 600 XP=XS:YP=YS
PQ 610 RETURN
MH 620 :
DX 630 FORI=0TO127:READA:CK=CK
      +A:POKE3584+I,A:NEXT
JG 640 IFCK<>1257THENPRINT"ERR
      OR IN DATA STATEMENTS":
      STOP
PX 650 RETURN
EF 660 DATA 0,0,0,0,0,0,0,0,0
AE 670 DATA 0,0,0,0,0,0,0,0,0
HC 680 DATA 0,0,0,128,0,0,64,0
AP 690 DATA 0,32,0,255,240,0,0
      ,32
XH 700 DATA 0,0,64,0,0,128,0,0
RP 710 DATA 0,0,0,0,0,0,0,0,0
KM 720 DATA 0,0,0,0,0,0,0,0,0
FK 730 DATA 0,0,0,0,0,0,0,0,0
BJ 740 DATA 0,0,0,0,0,0,0,0,0
RJ 750 DATA 0,0,0,0,0,0,0,0,0
EA 760 DATA 0,0,0,2,0,0,4,0
FQ 770 DATA 0,8,0,0,31,255,0,8
EA 780 DATA 0,0,4,0,0,2,0,0
RR 790 DATA 0,0,0,0,0,0,0,0,0
MR 800 DATA 0,0,0,0,0,0,0,0,0
GQ 810 DATA 0,0,0,0,0,0,0,0,0
```

Program 5: 128 Sprite Dump

```
BE 10 REM COPYRIGHT 1987 COMPU
      TE! PUBLICATIONS INC. -
      {SPACE}ALL RIGHTS RESERV
      ED
DE 20 PRINT"{CLR}{3 SPACES}COP
      YRIGHT 1987 COMPUTE! PUB
      ., INC."
XG 30 PRINTTAB(10)"ALL RIGHTS
      {SPACE}RESERVED":SLEEP3
QD 40 GRAPHIC1,0:GRAPHIC0,1
SP 50 COLOR0,4:COLOR4,4:COLOR5
      ,1
RM 60 PRINT"{10 DOWN}
      {5 SPACES}SPRITE DUMP"
QD 70 BLOAD"SCREENDUMP.ML"
KS 80 PRINT"{6 DOWN}{5 SPACES}
      SCREEN WILL BLANK DURING
       PRINTING"
RQ 90 INPUT"{2 DOWN}{5 SPACES}
      SPRITE FILE NAME";P$:IFP
      $=""THEN140
GE 100 PRINT"{DOWN}{5 SPACES}I
      NSERT PICTURE DISK"
FA 110 PRINT"{5 SPACES}THEN PR
      ESS ANY KEY"
CG 120 GETKEYZ$
XX 130 BLOAD(P$)
JF 140 FAST
HK 150 OPEN4,4:PRINT#4,CHR$(8)
FF 160 FORI=1TO8:SPRSAVI,A$:GS
      HAPEA$,296,I*22:NEXT
AQ 170 A$="":P=POINTER(A$):X=I
      NT(P/256):A=P-256*X
JF 180 FORI=45TO42STEP-1
JD 190 SSHAPEA$,7*I,0,7*I+6,19
      9
CS 200 SYS4864,A,X
CB 210 IFPEEK(252)=0THENA$="":
      ELSEA$=LEFT$(A$,PEEK(25
      2))
SE 220 PRINT#4,A$
DX 230 NEXT
HF 240 PRINT#4,CHR$(15)
FQ 250 CLOSE4
QD 260 SLOW
```

Sub Attack

See instructions in article on page 30 before typing in.

```
C000:A2 00 8E A0 0F 8E A1 0F B3
C008:8E A2 0F 8E A3 0F 8E 0E C8
C010:D4 8E 07 D4 AD 14 03 8D 1F
C018:88 13 AD 15 03 8D 89 13 1E
C020:78 A9 2F 8D 14 03 A9 C0 C7
C028:8D 15 03 58 4C 5E C0 AD A6
```

```
C030:8A 13 C9 3C F0 06 EE 8A C0
C038:13 6C 88 13 A9 00 8D 8A 93
C040:13 AD 0A 08 C9 59 D0 0B D8
C048:A9 00 8D 0A 08 EE 0B 08 0B
C050:6C 88 13 F8 18 69 01 8D 12
C058:0A 08 D8 6C 88 13 A2 00 98
C060:8A 9D 00 08 E8 E0 64 D0 73
C068:F8 AA 9D 00 D4 E8 E0 19 E9
C070:D0 F8 A9 00 85 C6 8D 15 45
C078:D0 8D 1D D0 8D 17 D0 A9 8A
C080:01 8D 0C 08 A9 87 8D 00 6E
C088:08 A9 06 8D 20 D0 8D 21 92
C090:D0 A9 93 20 D2 FF 20 64 94
C098:CA A2 00 E8 BC 31 CB E8 E1
C0A0:BD 31 CB C9 00 F0 F4 C9 DA
C0A8:FF F0 07 99 90 05 C8 4C 57
C0B0:9F C0 A2 00 A9 01 9D C8 DB
C0B8:D8 9D 90 D9 9D 58 DA 9D 5F
C0C0:C2 DA E8 E0 FF D0 ED 20 C4
C0C8:E4 FF EE 23 08 C9 85 F0 30
C0D0:1E C9 86 D0 06 20 B2 C4 8C
C0D8:4C C7 C0 C9 87 D0 E8 20 98
C0E0:9E C4 8E 0C 08 8A 18 69 79
C0E8:30 8D 6A 06 4C C7 C0 A9 40
C0F0:93 20 D2 FF A9 A0 A2 00 B3
C0F8:9D 28 04 E8 E0 A0 D0 F8 86
C100:AC 23 08 A9 2A 99 F0 04 DB
C108:20 E1 C4 99 A4 05 20 E1 A1
C110:C4 99 58 06 20 E1 C4 99 73
C118:C0 06 AA 98 4A 4A A8 8A B3
C120:99 F0 04 99 28 05 99 36 85
C128:06 AA 98 4A 4A A8 8A 99 B4
C130:0B 07 99 6E 05 99 4E 07 47
C138:A2 00 A9 0E 9D 00 D8 9D 5F
C140:FE D8 9D FD D9 9D FB DA 25
C148:E8 E0 FF D0 ED A2 00 8A 0A
C150:9D 00 30 9D D4 30 9D CE F3
C158:31 9D 64 32 9D 63 33 E8 55
C160:E0 FF D0 EC A2 00 BD 7E 4C
C168:CB 9D 19 30 BD 8C CB 9D B4
C170:59 30 E8 E0 0E D0 EF A2 0E
C178:00 BD 9A CB 9D 92 30 E8 FB
C180:E0 17 D0 F5 A2 00 BD B2 F6
C188:CB 9D C1 30 E8 E0 14 D0 58
C190:F5 A9 FF 8D 1F 31 A9 60 C3
C198:8D 5C 31 8D 5F 31 A9 F0 FC
C1A0:8D C4 31 8D CA 31 8D D0 22
C1A8:31 A9 1C 8D C7 31 8D CD 77
C1B0:31 A2 00 BD D2 CB 9D 81 D3
C1B8:31 E8 E0 3A D0 F5 20 DB 49
C1C0:C1 A9 00 8D 0A 08 8D 0B FE
C1C8:08 8D 8A 13 8D A0 0F 8D D0
C1D0:A1 0F 8D A2 0F 8D A3 0F C9
C1D8:4C 78 C4 AD 15 D0 09 03 15
C1E0:29 E7 8D 15 D0 A0 C0 8C 0D
C1E8:F8 07 C8 8C F9 07 A0 18 D1
C1F0:8C 00 D0 A0 ED 8C 01 D0 53
C1F8:8C 03 D0 A0 00 8C 27 D0 F8
C200:8C 2A D0 C8 8C 28 D0 8C 30
C208:2B D0 AD 10 D0 09 02 8D 4A
C210:10 D0 AD 10 D0 29 FE 8D 3F
C218:10 D0 A9 40 8D 02 D0 A9 D2
C220:C3 8D FA 07 8A AD 1E D0 D2
C228:A9 C4 8D FB 07 8D FC 07 94
C230:AD 1F D0 A9 0F 8D 2C D0 E0
C238:8D 2D D0 A2 53 A0 01 20 53
C240:D3 C8 A0 00 20 D3 C8 A9 81
C248:10 8D 04 D4 60 20 F0 CA 37
C250:20 B7 CA AD 03 08 C9 00 D3
C258:D0 13 AD 10 08 C9 00 D0 F9
C260:0C AD 11 08 C9 00 D0 05 EE
C268:A9 00 8D 0D 08 AD 0B 08 5A
C270:CD 0C 08 D0 03 4C E7 C4 CB
C278:AE 1E D0 8A 29 1B C9 1B 04
C280:D0 03 4C 99 C2 8A 29 11 F5
C288:C9 11 D0 03 4C 8C C3 8A 28
C290:29 0A C9 0A D0 03 4C 80 B2
C298:C3 8A 29 05 C9 05 D0 03 1F
C2A0:4C 8C C3 8A 29 06 C9 06 8B
C2A8:D0 03 4C 80 C3 8A C9 20 E4
C2B0:B0 03 4C C9 C2 8A 29 01 09
C2B8:C9 01 D0 03 4C 5E C3 8A 9B
C2C0:29 02 C9 02 D0 03 4C 3C 1C
C2C8:C3 8A 29 0C C9 0C D0 03 DB
C2D0:4C 1A C3 8A 29 14 C9 14 65
C2D8:D0 03 4C 2B C3 AE 1F D0 AB
C2E0:AD 01 D0 C9 56 90 0A 8A C7
C2E8:29 01 C9 01 D0 03 4C 0B C2
C2F0:C3 AD 03 D0 C9 56 90 1F 19
C2F8:8A 29 02 C9 02 D0 18 A9 18
C300:C2 8D F9 07 A9 01 A2 00 92
C308:4C CA CA A9 C2 8D F8 07 A1
C310:A9 01 A2 02 4C CA CA 4C 90
C318:E9 C3 A9 C7 8D FA 07 A9 47
C320:01 8D 0E 08 A9 03 A2 00 6C
C328:4C CA CA A9 C7 8D FA 07 ED
C330:A9 01 8D 0E 08 A9 03 A2 EE
C338:02 4C CA CA A9 C2 8D F9 47
C340:07 A9 40 8D 24 08 A2 02 1F
C348:A0 01 AD 1D D0 2D 24 08 73
C350:C9 40 D0 03 20 BB C6 A9 3E
C358:03 A2 00 4C CA CA A9 C2 66
C360:8D F8 07 A9 20 8D 24 08 EF
C368:A0 00 A2 00 AD 1D D0 2D 45
C370:24 08 C9 20 D0 03 20 BB D5
C378:C6 A9 03 A2 02 4C CA CA F9
C380:A9 C2 8D F9 07 A9 05 A2 6A
C388:00 4C CA CA A9 C2 8D F8 95
C390:07 A9 05 A2 02 4C CA CA 72
C398:18 F8 BD A1 0F 6D 1F 08 B0
C3A0:9D A1 0F B0 02 D8 60 BD 3E
C3A8:A0 0F 69 00 9D A0 0F D8 D7
C3B0:60 A2 00 E0 FF F0 04 E8 D3
C3B8:4C B3 C3 AE 06 08 E0 FF C8
C3C0:F0 08 EE 06 08 A2 00 4C 18
C3C8:B3 C3 A9 00 8D 06 08 60 45
C3D0:A9 C2 8D F8 07 20 B1 C3 FE
C3D8:20 DB C1 4C 17 C3 A9 C2 42
C3E0:8D F9 07 20 B1 C3 20 DB 49
C3E8:C1 AD 07 D0 C9 4F D0 19 F0
C3F0:AD 34 08 C9 0A F0 06 EE 09
C3F8:34 08 4C 09 C4 A2 53 A0 AE
C400:00 A9 08 8D 07 08 20 D3 3A
C408:C8 AD 09 D0 C9 4F D0 19 D5
C410:AD 35 08 C9 0A F0 06 EE 6A
C418:35 08 4C 29 C4 A2 53 A0 52
C420:01 A9 10 8D 07 08 20 D3 DB
C428:C8 AD 03 08 C9 01 F0 05 9B
C430:A9 01 8D 30 08 A2 00 A0 EE
C438:00 A9 20 8D 24 08 A9 01 9E
C440:8D 25 08 20 EF C4 A2 02 B6
C448:A0 01 A9 40 8D 24 08 8E 37
C450:25 08 20 EF C4 AD 03 08 5C
C458:C9 01 D0 08 F0 03 4C 78 46
C460:C4 4C 21 C7 AD 02 08 C9 4F
C468:7D D0 0D AD 04 08 C9 05 3A
C470:D0 03 4C F7 C6 EE 04 08 2E
C478:20 F4 C7 20 64 CA A2 00 DD
C480:8E 01 08 EC 00 08 F0 04 67
C488:E8 4C 83 C4 AD 01 08 C9 A1
C490:03 F0 08 EE 01 08 A2 00 35
C498:4C 83 C4 4C 4D C2 AD 6A C1
C4A0:06 C9 31 D0 03 A2 03 60 DB
C4A8:C9 33 D0 03 A2 05 60 A2 BA
C4B0:01 60 AE 5F 06 E0 06 D0 2F
C4B8:07 A0 87 A2 00 4C CF C4 9E
C4C0:E0 0D D0 07 A0 FF A2 04 D6
C4C8:4C CF C4 A0 50 A2 08 8C B8
C4D0:00 08 A0 00 BD C6 CB 99 AA
C4D8:5F 06 C8 E8 C0 04 D0 F4 E7
C4E0:60 AA 98 2A A8 8A 60 A9 D4
C4E8:00 8D 15 D0 4C 5E C0 B9 9C
C4F0:10 08 C9 01 F0 13 AD 30 2D
C4F8:08 C9 01 F0 0B AD 04 D0 10
C500:DD 00 D0 D0 03 4C 00 C6 B1
C508:60 A9 01 8D 0D 08 B9 14 37
C510:08 C9 01 D0 03 4C 9C C5 87
C518:AD 22 08 C9 0A D0 24 A9 26
C520:00 8D 22 08 C0 01 F0 0F CE
C528:18 AD 20 08 E9 0A 8D 0F 51
C530:D4 8D 20 08 4C 43 C5 18 21
C538:AD 21 08 E9 0A 8D 08 D4 ED
C540:8D 21 08 EE 22 08 BD 0B 82
C548:D0 DD 31 08 F0 14 FE 31 61
C550:08 BD 0B D0 DD 31 08 F0 72
C558:06 DE 31 08 4C B4 C6 DE E6
C560:31 08 A9 C6 99 FD 07 C0 BB
C568:01 D0 12 A9 8A 8D 0D D4 FE
C570:A9 0F 8D 08 D4 A9 81 8D A4
C578:0B D4 4C 8C C5 A9 8A 8D 88
C580:14 D4 A9 0F 8D 0F D4 A9 6D
C588:81 8D 12 D4 FE 16 08 BD E5
C590:16 08 C9 50 D0 05 A9 01 56
C598:99 14 08 60 FE 19 08 BD 27
C5A0:19 08 C9 14 D0 03 4C BB 1C
C5A8:C6 BD 1C 08 C9 01 D0 01 FF
C5B0:60 C0 01 F0 0D A9 07 8D 76
C5B8:0F D4 A9 80 8D 12 D4 4C E8
C5C0:CC C5 A9 07 8D 08 D4 A9 A9
C5C8:80 8D 0B D4 BD 0B D0 E9 4C
C5D0:0A 9D 0B D0 38 BD 0A D0 D4
C5D8:E9 0A 9D 0A D0 B0 09 AD 39
C5E0:10 D0 4D 24 08 8D 10 D0 FB
C5E8:AD 1D D0 0D 24 08 8D 1D F6
C5F0:D0 AD 17 D0 0D 24 08 8D D6
C5F8:17 D0 A9 01 9D 1C 08 60 57
C600:AD 10 D0 2D 25 08 CD 25 5F
C608:08 D0 15 AD 10 D0 29 04 65
C610:C9 04 D0 15 AD 10 D0 0D 4B
C618:24 08 8D 10 D0 4C 2A C6 3F
C620:AD 10 D0 29 04 C9 00 F0 6D
C628:0D 60 BD 00 D0 C9 3B 90 C0
C630:11 A9 3A 4C 45 C6 BD 00 7D
C638:D0 C9 22 B0 05 A9 22 4C 4F
C640:45 C6 BD 00 D0 9D 0A D0 BB
C648:BD 01 D0 C9 DD 90 5C A9 3F
C650:DC 9D 31 08 A9 50 9D 0B 2F
C658:D0 A9 C5 99 FD 07 AD 15 87
C660:D0 0D 24 08 8D 15 D0 A9 AA
C668:01 99 10 08 A9 01 8D 0D D8
C670:08 C0 01 F0 1C A9 FF 8D 76
C678:20 08 A9 00 8D 0F D4 A9 49
C680:C0 8D 13 D4 A9 FA 8D 14 E9
C688:D4 A9 21 8D 12 D4 4C AA 0F
C690:C6 A9 FF 8D 21 08 A9 00 41
C698:8D 08 D4 A9 C0 8D 0C D4 4D
C6A0:A9 FA 8D 0D D4 A9 21 8D 61
C6A8:0B D4 60 C9 64 B0 A2 A9 6E
C6B0:64 4C 51 C6 FE 0B D0 FE DE
C6B8:0B D0 60 AD 15 D0 4D 24 91
C6C0:08 8D 15 D0 AD 10 D0 0D C1
C6C8:24 08 4D 24 08 8D 10 D0 BD
C6D0:A9 00 99 10 08 9D 31 08 88
C6D8:99 14 08 9D 16 08 9D 19 38
C6E0:08 9D 1C 08 AD 1D D0 4D AE
C6E8:24 08 8D 1D D0 AD 17 D0 4A
C6F0:4D 24 08 8D 17 D0 60 A9 6E
C6F8:00 8D 30 08 8D 29 D0 A9 CC
C700:53 8D 05 D0 AD 10 D0 09 A2
C708:04 8D 10 D0 A9 58 8D 04 D9
C710:D0 A9 01 8D 03 08 AD 15 14
C718:D0 09 04 8D 15 D0 4C 78 A8
C720:C4 A9 11 8D 04 D4 A9 0F 4D
C728:8D 05 D4 A9 30 8D 06 D4 8D
C730:AD 26 08 C9 64 D0 32 A9 32
C738:01 8D 0D 08 A9 00 8D 26 5C
C740:08 AD 27 08 C9 01 F0 12 EA
C748:A9 01 8D 27 08 A9 08 8D 95
C750:01 D4 A9 61 8D 00 D4 4C 43
C758:69 C7 A9 0B 8D 01 D4 A9 38
C760:DA 8D 00 D4 A9 00 8D 27 9D
C768:08 EE 26 08 AD 04 D0 C9 E5
C770:00 D0 43 AD 10 D0 29 04 91
C778:C9 04 D0 15 A9 00 8D 04 C5
C780:08 AD 10 D0 29 FB 8D 10 F2
C788:D0 A9 FF 8D 04 D0 4C 78 38
C790:C4 A9 00 8D 03 08 8D 02 1B
C798:08 A9 00 8D 04 D0 A9 10 36
C7A0:8D 04 D4 AD 15 D0 49 04 EF
C7A8:8D 15 D0 AD 0F 08 C9 01 66
C7B0:D0 01 60 4C 78 C4 AD 05 F0
C7B8:08 C9 03 D0 0B A9 00 8D B8
C7C0:05 08 CE 04 D0 4C 78 C4 5C
C7C8:EE 05 08 4C 78 C4 AD 10 19
C7D0:D0 45 FB 8D 10 D0 A9 00 89
C7D8:9D 00 D0 60 AD 10 D0 25 CB
C7E0:FB C5 FB D0 2D 4C F3 C9 B8
C7E8:AD 10 D0 25 FB C5 FB F0 9F
C7F0:21 4C C7 C9 A0 08 8C 07 FE
C7F8:08 A0 01 84 FB 88 A2 00 64
C800:20 13 C8 A0 10 8C 07 08 52
C808:A0 02 84 FB 88 A2 02 20 AD
C810:13 C8 60 B9 00 DC 49 1F 2A
C818:29 1F 85 FC B9 08 08 C9 4E
C820:01 F0 03 4C 07 C9 B9 28 8E
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C828:08 C9 01 D0 36 BD 06 D0 E2
C830:C9 FD 90 11 AD 10 D0 0D A5
C838:07 08 8D 10 D0 A9 00 9D CC
C840:06 D0 4C 63 C8 AD 10 D0 B6
C848:2D 07 08 CD 07 08 D0 0A 14
C850:BD 06 D0 C9 50 90 03 4C 10
C858:D3 C8 FE 06 D0 FE 06 D0 A5
C860:FE 06 D0 B9 2A 08 C9 01 AE
C868:D0 30 BD 06 D0 C9 03 B0 EA
C870:0E AD 10 D0 4D 07 08 8D A7
C878:10 D0 A9 FF 9D 06 D0 C9 EB
C880:08 B0 0E AD 10 D0 2D 07 04
C888:08 CD 07 08 F0 03 4C D3 F2
C890:C8 DE 06 D0 DE 06 D0 DE 9B
C898:06 D0 B9 2C 08 C9 01 D0 95
C8A0:15 DE 07 D0 DE 07 D0 DE F5
C8A8:07 D0 BD 07 D0 C9 4F B0 17
C8B0:05 A9 4F 9D 07 D0 B9 2E 10
C8B8:08 C9 01 F0 03 4C A8 C9 54
C8C0:BD 07 D0 C9 F0 B0 0C FE 0B
C8C8:07 D0 FE 07 D0 FE 07 D0 C3
C8D0:4C A8 C9 A9 00 99 08 08 05
C8D8:99 34 08 C0 01 F0 06 8D B6
C8E0:07 D0 4C E8 C8 8D 09 D0 A1
C8E8:AD 15 D0 4D 07 08 8D 15 0E
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C908:FC 29 10 C9 10 F0 05 A5 F6
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C918:06 D0 BD 01 D0 9D 07 D0 86
C920:AD 10 D0 25 FB C5 FB D0 BA
C928:0C AD 10 D0 0D 07 08 8D 5E
C930:10 D0 4C 40 C9 AD 07 08 A8
C938:49 FF 2D 10 D0 8D 10 D0 C4
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C948:D0 A5 FC 29 08 C9 08 D0 28
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C990:F8 07 C9 C0 D0 08 A9 01 A2
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C9B0:4C D0 C9 CE 02 08 BD 00 70
C9B8:D0 C9 FF D0 03 4C CE C7 E2
C9C0:C9 40 D0 03 4C E8 C7 A9 D2
C9C8:C0 99 F8 07 FE 00 D0 60 AC
C9D0:C9 04 D0 28 EE 02 08 BD 34
C9D8:00 D0 C9 18 F0 12 C9 00 BE
C9E0:D0 11 AD 10 D0 45 FB 8D F8
C9E8:10 D0 A9 FF 9D 00 D0 60 DC
C9F0:4C DC C7 A9 C1 99 F8 07 E2
C9F8:DE 00 D0 60 C9 02 D0 0E 22
CA00:EE 02 08 BD 01 D0 C9 ED 37
CA08:F0 15 FE 01 D0 60 C9 01 E7
CA10:D0 0E EE 02 08 BD 01 D0 99
CA18:C9 52 F0 03 DE 01 D0 60 72
CA20:C9 09 D0 0D CE 02 08 20 76
CA28:15 CA CE 02 08 20 B6 C9 EC
CA30:60 C9 0A D0 0D EE 02 08 E6
CA38:20 03 CA EE 02 08 20 B6 0E
CA40:C9 60 C9 06 D0 0D EE 02 07
CA48:08 20 03 CA EE 02 08 20 A6
CA50:D7 C9 60 C9 05 D0 0C CE 3F
CA58:02 08 20 15 CA CE 02 08 E3
CA60:20 D7 C9 60 A9 00 8D 28 CB
CA68:D8 8D 29 D8 8D 2A D8 8D D4
CA70:2B D8 A9 01 8D 4C D8 8D F3
CA78:4D D8 8D 4E D8 8D 4F D8 F5
CA80:A9 03 8D 3A D8 8D 3B D8 4D
CA88:8D 3C D8 8D 3D D8 A0 00 76
CA90:A2 00 20 17 CB 20 23 CB DD
CA98:A0 01 A2 02 20 17 CB 20 48
CAA0:23 CB A0 02 A2 24 20 17 EB
CAA8:CB 20 23 CB A0 03 A2 26 C9
CAB0:20 17 CB 20 23 CB 60 AD 4E
CAB8:0D 08 C9 01 F0 06 A9 00 13
CAC0:8D 18 D4 60 A9 0F 8D 18 80
CAC8:D4 60 8D 1F 08 20 98 C3 3A
CAD0:20 B1 C3 20 DB C1 AD 0E AC
CAD8:08 C9 01 D0 08 A9 01 8D 88
CAE0:0F 08 20 91 C7 A9 00 8D 8F
CAE8:0E 08 8D 0F 08 4C 17 C3 8D
CAF0:AD 0A 08 29 0F 18 69 B0 CF
CAF8:8D 3D 04 A9 BA 8D 3B 04 46
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CB08:69 B0 8D 3C 04 AD 0B 08 EA
CB10:18 69 B0 8D 3A 04 60 B9 59
CB18:A0 0F 29 0F 18 69 B0 9D 3F
CB20:29 04 60 B9 A0 0F 4A 4A 15
CB28:4A 4A 18 69 B0 9D 28 04 61
CB30:60 20 07 13 15 02 20 20 23
CB38:00 2F 01 14 14 01 03 0B B2
CB40:00 3A 10 12 05 13 13 20 44
CB48:86 B1 00 57 03 0F 0D 10 83
CB50:15 14 05 21 00 62 14 0F EA
CB58:20 02 05 07 09 0E 00 A7 B9
CB60:13 10 05 05 04 20 86 B3 D7
CB68:00 B2 14 09 0D 05 20 86 03
CB70:B5 00 CF 0D 05 04 2E 00 42
CB78:DA 31 3A 30 30 FF 06 00 A1
CB80:80 0E 00 FF FF FF 8F FF FA
CB88:FE 00 7F E0 60 00 00 70 11
CB90:01 FF FF FF 7F FF F1 07 8F
CB98:FE 00 03 18 00 00 C1 80 95
CBA0:36 30 18 01 8D 80 CC 00 7A
CBA8:06 00 66 30 01 AC 00 0C D9
CBB0:60 C0 60 00 00 66 00 00 4E
CBB8:66 00 19 FF 80 0D FF E3 C2
CBC0:FF FF FF 7F FF FE 0D 05 6B
CBC8:04 2E 13 0C 0F 17 06 01 F2
CBD0:13 14 20 00 02 02 00 00 13
CBD8:00 00 00 00 00 21 98 40 66
CBE0:04 02 00 00 00 00 01 98 95
CBE8:00 80 00 10 06 40 80 10 E3
CBF0:26 00 80 00 10 01 98 00 61
CBF8:00 00 00 04 02 00 21 98 BB
CC00:40 00 00 00 00 00 00 04 BD
CC08:02 00 00 40 00 00 00 00 A6
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HIT YOUR BUZZER if you know the answer, to name that trivia tune. If you're wrong your opponent gets a chance. But if you're right then you get the score! And you may even qualify for the Hall of Records!! But don't get over-confident because another trivia tune is on it's way...

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Also currently available:
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Educational Series

Merit Audio Visual has released a series of disks intended to help students in grades four and above learn basic math problem-solving skills. *Word Problem Tutor* is designed to teach the student how to solve word problems and estimate answers. The student must select the correct operations in order to solve the problem. There are four levels of difficulty for the students and a class record manager for the teacher.

The eleven disks in the series are: addition and subtraction; multiplication and division; multiplication, division, and multi-operations; multi-operations: whole numbers; mixed practice: whole numbers; fractions; decimals; fractions and decimals; percents; mixed practice: fractions, decimals, and percents; and a teacher's key for all the data disks.

The retail price for each disk is $49.95. All eleven disks can be purchased for $449.95.

Merit Audio Visual, 157 Chambers St., New York, 10007
Circle Reader Service Number 200.

Presidential Elections Predictor

With *President Elect—1988 Edition,* you can simulate any presidential election from 1960 through the upcoming 1988 election. This new game from Strategic Simulations contains a roster of 71 actual candidates, or you can create your own candidate. The game covers a nine-week period—from Labor Day to Election Night—in which you must campaign, allocate campaign funds, study the polls, and perform the duties of a candidate or campaign manager.

The program rates candidates on social, economic, and foreign policy as well as speaking ability, magnetism, and poise. Other variables affecting the polls include incumbency, economic factors, and the nation's confidence index. You can change any of these factors to see how each affects the outcome.

President Elect—1988 Edition is designed for up to three players (grade 5 through college-level). Play may last from one-half hour up to six hours.

The package includes a disk, rulebook, campaign strategy sheet, and an election map. Retail price is $24.95.

Strategic Simulations, 1046 N. Rengstorff Ave., Mountain View, CA 94043
Circle Reader Service Number 201.

Educational Software

Four new educational programs from Gamco reward students with an arcade game when they score a certain percentage in each lesson. Students have three chances to answer each question before the correct answer is displayed. The student's performance is recorded at the end of every lesson.

Each program holds up to 200 names and records which teachers can view or print out. Teachers may choose to use the game option, choose the percentage of correct responses, and choose to turn the sound on or off.

The first program, *Addition and Subtraction,* has six difficulty levels for addition and five levels for subtraction. The program also offers two levels of difficulty in the mixed-operations section. *Multiplication and Long Division,* like *Addition and Subtraction,* has six levels of difficulty for multiplication and five levels for division, plus two more levels for mixed operations. Both of these programs are part of the Whole Numbers series.

Parts of Speech includes six different lessons: nouns, verbs, pronouns, adjectives, adverbs, and prepositions.

States and Capitals provides eight lessons in U.S. geography, including two-letter abbreviations for states, locating states on maps, learning the capital city of each state, and learning the principal cities in a state.

Each of these programs is available on the Commodore 64 for $44.95.

Gamco Industries, Box 1911, Big Spring, TX 79721
Circle Reader Service Number 202.

Arcade-Style Adventures

In *Sky Runner* from Spinnaker, you must protect twenty-fourth-century man from the drug, Sky, by destroying the Sky-manufacturing machines and their defenses. Your jet skimmer and three sky bikers help you out.

In *Bazooka Bill,* you have to ward off various enemy soldiers, tanks, trucks, and aircraft using your fists and an arsenal of machine guns, flame throwers, knives, bazookas, and jet fighters. There are over 100 screens of territory with as many as 15 attackers on one screen.

Both of these arcade-adventure games for the Commodore 64 require a joystick. The retail price for *Sky Runner* is $29.95; *Bazooka Bill* is $19.95.

Spinnaker Software, 1 Kendall Square, Cambridge, MA 02139
Circle Reader Service Number 203.

New Releases From Brøderbund

Several new software packages are now available for the Commodore 64 from Brøderbund. *Type!,* a typing-instruction program, comes with a limited-time offer in which you can receive a $10 rebate if you mail Brøderbund the program disk from an old typing-instruction program, along with a coupon and your sales receipt for *Type!.* Retail price is $39.95.

Cauldron is two games in one.

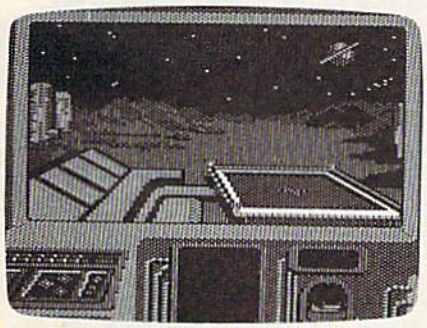
In the first game, you are a witch queen in search of your golden broom which has been stolen by the pumpking. In the second game, you take the part of the pumpking warrior who must destroy the witch queen. In both games, the object is to collect ingredients to brew a magic spell in the cauldron. There are over 190 scenes with sound and music. The retail price for the package is $29.95.

Brøderbund has reduced the price of *The Toy Shop* to $39.95. This program assists you in designing models such as antique trucks, a carousel, and jet planes. You can then print out your design, paste it onto cardstock, and cut out and assemble the model. There is also a *Toy Shop Refill* for $19.95.

Brøderbund Software, 17 Paul Dr., San Rafael, CA 94903-2101
Circle Reader Service Number 204.

Space Defenders

Deep Space is a 3-D space combat simulation packaged to resemble a briefing kit; it comes in an accordion-style file folder with press clippings, a memo from the Commander-in-Chief, a letter from the President of United Planets, an intelligence report on Operation Copernicus, and the starship training manual.



Control tower view from Deep Space.

The goal is to defend the asteroid belt between Jupiter and Mars from invading aliens. There are four main missions—collect uranium deposits, escort envoy ships out of hostile territory, eliminate a deadly bacteria, and defend the Hurculis base from attack. Your spaceship cockpit has an instrument panel display, side views, and a view from the control tower. The actual laws of motion in space take effect whenever you maneuver the ship. Three skill levels are available.

Deep Space retails for $39.95 for the Commodore 64 version.

Sir-Tech Software, P.O. Box 245, Charlestown Ogdensburg Mall, Ogdensburg, NY 13669
Circle Reader Service Number 205.

Create A BBS

With *The Boss* from SoftTools, you can create your own bulletin board system, customizing it for your users. *The Boss* is written in machine language for speed and is not copy-protected. The program contains most of the code for a telecommunications program, and it also helps you write small routines to add to the programs. The latest version includes a system editor with word wrap for 80-column mode.

SoftTools provides telephone support for registered users of *The Boss*, as well as a manual, a newsletter, and the Generic BBS service.

The price of *The Boss* is $35. Disk updates are available for $10.

SoftTools, Snowdon, P.O. Box 1205, Montreal, Quebec, Canada H3X 3Y3
Circle Reader Service Number 206.

Brush Up On Your Etiquette

A new program from Blue Lion Software is designed to help people of all ages increase their knowledge of proper manners, both at home and internationally. *RSVP* presents a variety of social and business situations and then tests the player's response. First, the player chooses a career and then responds to real-life situations such as troublesome telephone calls and preparing business letters. The player's career progresses as he or she appropriately responds to the scenarios. Outside of business, there are also role-playing games for formal dinner parties and learning to deal with the special ways of friends and associates. Question-and-answer sections quiz players on various foreign countries and categories.

Available for the Commodore 64 for $29.95.

Blue Lion Software, P.O. Box 650, Belmont, MA 02178
Circle Reader Service Number 207.

Energy Crisis

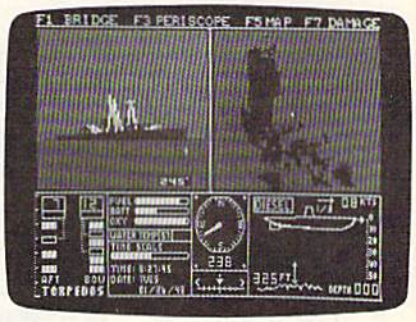
Careful moves and strategy are necessary for you to defeat the sentry and her army of landgazers in *The Sentry*. Energy is the most important commodity in this new game from Firebird, and you and your robot must absorb the energy from the sentry in order to save the world. However, at the same time, you have to avoid the stares of the landrovers, which will steal your energy. All the action takes place over 10,000 landscapes in 3-D graphics.

The Sentry for the Commodore 64 includes an illustrated book, a quick-key guide, and a pin-on button. Suggested retail price is $39.95.

Firebird Licensees, P.O. Box 49, Ramsey, NJ 07446
Circle Reader Service Number 208.

Be A Sub Commander

You can take command of a World War II fleet-class submarine with ActionSoft's *Up Periscope!* for the Commodore 64. There are 14 historical scenarios for you to follow, or you can create your own dives. Your mission is to search the Atlantic and Pacific Oceans for freighters,



A scene from ActionSoft's Up Periscope!

tankers, troop ships, destroyers, and battleships, and to torpedo all enemy vessels. Your equipment includes an instrument panel, radars, a variable-power periscope, torpedo data computer, and charts of the oceans. There's an adjustable time scale and a realilty mode. The ships appear in 3-D graphics.

Retail price is $29.95.

ActionSoft, 201 W. Springfield, Ave., Suite 711, Champaign, IL 61820
Circle Reader Service Number 209.

New Releases From EA

Electronic Arts has released several new games for the Commodore 64. With *EOS: Earth Orbit Stations*, you are in charge of setting up and maintaining space stations. There

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Lock Pik 64/128 was put together by Utilities Unlimited as a tool for those who have a desire to find out how the heavy hackers do it. This package includes:

1. Lock Pik book that gives you step-by-step instructions on **breaking** or backing up over 100 popular programs using Hesmon and Superedit. The instructions are so clear and precise that anyone can use it.

2. Lock Pik disk has Hesmon 64, Superedit, Disk Compare, Kernal Save, I/O Save, and Disk File log with detailed instructions on how to use these programs all on one disk.

3. We also have a limited supply of Hesmon cartridges that will be given out free while supply lasts.

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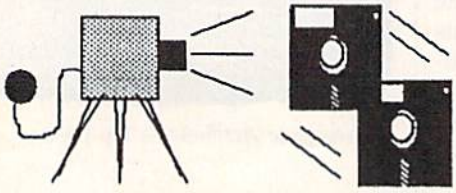

The programmers who created Snapshot 64, the hottest "memory capture" utility on the market, have done it again! Introducing SUPER SNAPSHOT, the ultimate cartridge for the C64/C128.

SUPER SNAPSHOT combines several different functions into one revolutionary new cartridge. First and foremost, SUPER SNAPSHOT is a state-of-the-art memory capture device. This means that you can load a program into your computer's RAM and, at the touch of a button, capture an exact image of your computer's memory. That image can then be saved to disk, allowing you to make working, UNPROTECTED backups of your software!

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We'd like to go into more detail, but we can't—these titles are so hot, we can't mention their names in this ad. But you know the ones we mean. Just think of the biggest names in software. Think of the most complex and effective protection schemes you've ever run up against. Now think of the very best archival software on the market today...

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EOS retails for $29.95.

Legacy of the Ancients is a fantasy adventure game set in the world of Tarmalon. Your mission is to find the wizard's compendium, which contains evil powers. The search begins at the Museum of the Ancients and continues through 12 towns, forests, castles, and a series of dungeons. Along the way, you take part in five games—three combat games and two at the casino tables—and battle many creatures. You can also rob banks and gamble away your prizes.

Legacy of the Ancients retails for $29.95.

Electronic Arts has also released a new software line, Amazing Software. *Dan Dare: Pilot of the Future*, the first program in the new line, is an adventure game in which Dan Dare searches for his cohorts on an atomic asteroid. Dan must rescue his friends and stop the asteroid from destroying earth.

Each screen in *Dan Dare* represents a panel from the comic book of the same name. The game includes sound, animation, and 3-D graphics.

Titles in the Amazing software line will be priced between $20 and $25. *Dan Dare* will retail for $19.95.

Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404
Circle Reader Service Number 210.

WWII Rescue Mission

Three Allied saboteurs are being held in a top-secret Nazi fortress, and you must rescue them before they escape. At the same time, you have to destroy the fortress while saving the art treasures of Europe also held by the Nazis. *Into the Eagle's Nest* takes you on four missions and features sound, graphics, and four-way scrolling animation. The action takes place on four floors connected by elevators; you view the action from the top looking down.

Into the Eagle's Nest for the Commodore 64 has a retail price of $29.95.

Mindscape, 3444 Dundee Rd., Northbrook, IL 60062
Circle Reader Service Number 211.

Be A Winner

The Lotto Program analyzes past winning lottery numbers and creates charts based on probability from which you pick the numbers to play. Files can be updated by entering the winning numbers from lottery games each week. From the charts, players may then choose hot and cold numbers, frequency, patterns, sums of digits, odd-even numbers, and digit groups. The program works for six- and seven-digit lottery games. *The Lotto Program* includes a program for selecting numbers without your computer.

The program is disk-based and menu-driven. Cassette tape versions are available by special request.

The price for *The Lotto Program* is $24.95.

Soft-Byte, P.O. Box 556, Forest Park, Dayton, OH 45405
Circle Reader Service Number 212.

Larger Characters

Kidsview Software has released two products especially for children and visually impaired computer users. *Kidsview* can double the size of the characters on the screen. This program is designed to be a development and display tool, but it may also be used to write and run programs. It also supports *Muppet Learning Keys*. *Kidsword* is a word processor in which the character size is enlarged. Users can change the character and background colors for most comfortable reading. The *Kidsword* screen can hold ten lines of text plus two status lines.

In both programs, the character size on a 14-inch monitor is 5/8 inch, and is 1-1/4 inches on a 25-inch monitor. With the programs, you can display numbers, upper- and lowercase letters, and special characters.

Kidsview and *Kidsword* are available on disk for the Commodore 64 and include a manual. Suggested retail price for each program is $29.95.

Kidsview Software, P.O. Box 98, Warner, NH 03278
Circle Reader Service Number 214.

BASIC Debugger

Micro Detective provides an error detector, debugger, and programming utility kit for BASIC programmers on the Commodore 64. The error detector can find and give an explanation of many errors, including syntax and illegal quantity errors. The debugger, the bugbuster trace routine, lets you see each statement as it is executed, shows the value of the variables, and can also trace an expression. You can turn the trace on or off with one keystroke and get a list of the variables, loops, and files used. The programmer's utility kit provides over 30 commands and a cross reference of variables. An editing feature also allows you to scroll up and down the program listing using the cursor.

Micro Detective requires a Commodore 64 and disk drive, and retails for $49.95.

American Made Software, P.O. Box 323, Loomis, CA 95650
Circle Reader Service Number 215.

Bombing Simulator

Strategic Simulations has introduced *B-24*, a flight simulator that contains 19 World War II missions flown by the 406th Bombardment Group to the Ploesti, Romania oil fields. *B-24* players perform the duties of the pilot, co-pilot, navigator, engineer, and bombardier of a B-24 Liberator bomber. The program allows players to set the flight path, speed, altitude, and bomb drop points. Changeable variables include engine performance and accuracy of bombing, as well as random weather conditions. The instrument panel indicates altitude, vertical speed, heading, air speed, and degree of bank/turn and pitch. There are also training missions to Mostar and Bucharest to allow practice of take-off, landing, and bombing skills.

B-24 is available for the Commodore 64 for $34.95.

Strategic Simulations, 1046 N. Rengstorff Ave., Mountain View, CA 94043
Circle Reader Service Number 216.

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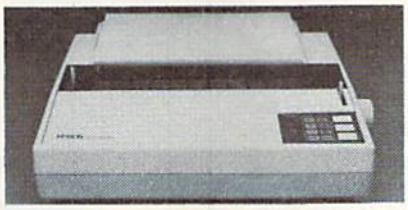

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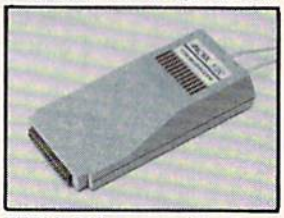

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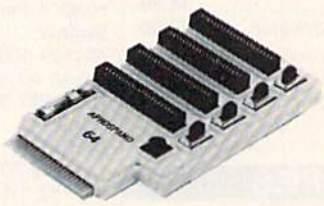

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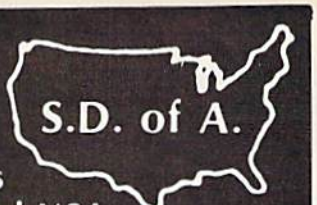

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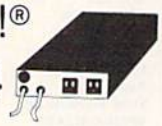

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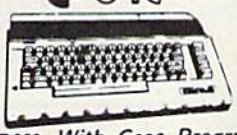

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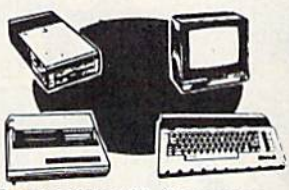

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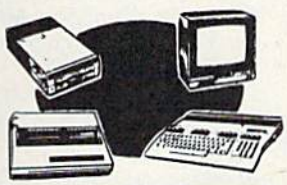

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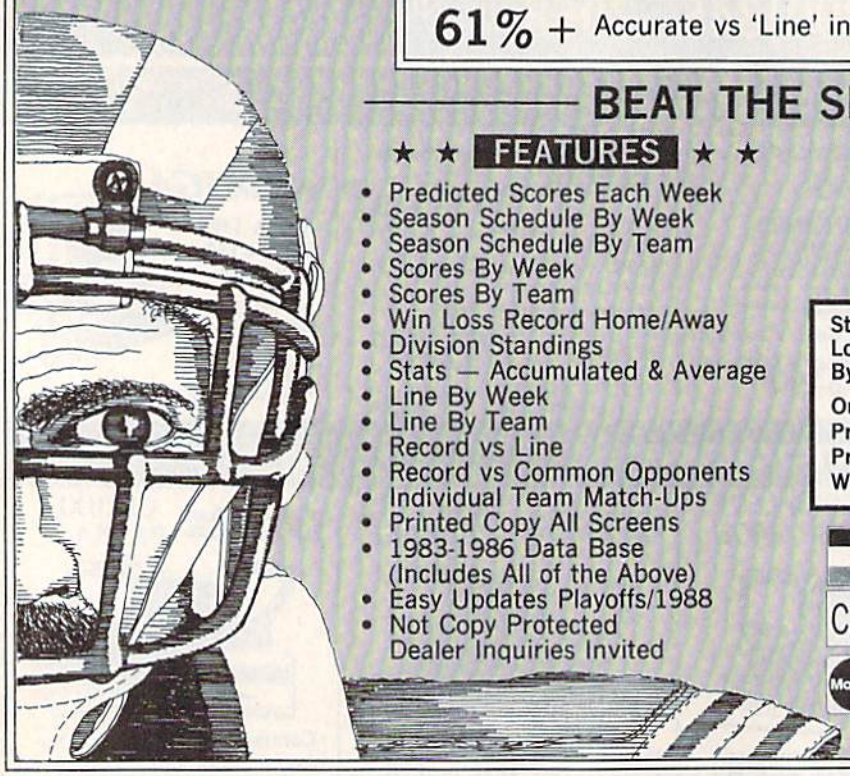

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COMPUTE!'s GAZETTE Author's Guide

Here are some suggestions which serve to improve the speed and accuracy of publication for prospective authors. COMPUTE!'s GAZETTE is primarily interested in new and timely articles on the Commodore 128, 64, Plus/4, and 16. We are much more concerned with the content of an article than with its style, but articles should as be clear and well-explained as possible.

The guidelines below will permit your good ideas and programs to be more easily edited and published:

1. The upper left corner of the first page should contain your name, address, telephone number, and the date of submission.

2. The following information should appear in the upper right corner of the first page: If your article is specifically directed to one model of computer, please state the model name. In addition, *please indicate the memory requirements of programs.*

3. The underlined title of the article should be placed about ⅔ of the way down the first page.

4. Following pages should be typed normally, except that in the upper right corner there should be an abbreviation of the title, your last name, and the page number—for example: Memory Map/Smith/2.

5. All lines within the text of the article must be double- or triple-spaced. A one-inch margin should be left at the right, left, top, and bottom of each page. No words should be divided at the ends of lines. And please do not right-justify. Leave the lines ragged.

6. Standard typing or computer paper should be used (no erasable, onionskin, or other thin paper), and typing should be on one side of the paper only (upper- and lowercase).

7. If you are submitting more than one article, send each one in a separate mailer with its own tape or disk.

8. Short programs (under 20 lines) can easily be included within the text. Longer programs should be separate listings. *It is essential that we have a copy of the program, recorded twice, on a tape or disk.* If your article was written with a word processor, we request that you include a copy of the text file on the tape or disk. If you include a copy of your article on disk, please save the article as plain text, without any special formatting characters or control codes. Most word processors provide an option for saving a document as plain ASCII text or in unformatted form. Please use high-quality 10- or 30-minute tapes with the program recorded on both sides. The tape or disk should be labeled with your name and the title of the article. Tapes are fairly sturdy, but disks need to be enclosed within plastic or cardboard mailers (available at photography, stationery, or computer supply stores). If possible, programs written in machine language or a compiled language should include source code (or an annotated disassembly if the program was written with a machine language monitor).

9. A good general rule is to spell out the numbers zero through ten in your article and write higher numbers as numerals (1024). The exceptions to this are: Figure 5, Table 3, TAB(4), and so on. Within ordinary text, however, the zero through ten should appear as words, not numbers. Also, symbols and abbreviations should not be used within text: Use *and* (not &), *reference* (not ref.), *through* (not thru).

10. For greater clarity, use all capitals when referring to keys (RETURN, CTRL, SHIFT), BASIC words (LIST, RND, GOTO), and the language BASIC. Headlines and subheads should, however, be initial caps only, and emphasized words are not capitalized. If you wish to emphasize, underline the word; then it will be italicized during typesetting.

11. Articles can be of any length—from a single-line routine to a multiple-issue series. The average article is about four to eight double-spaced, typed pages.

12. We do not consider articles which are submitted simultaneously to other publishers. If you wish to send an article to another magazine for consideration, please do not submit it to us.

13. COMPUTE!'s GAZETTE pays between $70 and $800 for published articles. In general, the rate reflects the length and quality of the article. Payment is made upon acceptance. Following submission (to Editorial Department, COMPUTE!'s GAZETTE, P.O. Box 5406, Greensboro, NC 27403), it will take from four to eight weeks for us to reply. If your work is accepted, you will be notified by a letter which will include a contract for you to sign and return. *Rejected manuscripts are returned to authors who enclose a self-addressed, stamped envelope.*

14. If your article is accepted and you subsequently make improvements to the program, please submit an entirely new tape or disk and a new copy of the article reflecting the update. We cannot easily make revisions to programs and articles. It is necessary that you send the revised version as if it were a new submission entirely, but be sure to indicate that your submission is a revised version by writing *Revision* on the envelope and the article.

15. COMPUTE!'s GAZETTE does not accept unsolicited product reviews. If you are interested in serving on our panel of reviewers, contact the Features Editor for details.

How To Type In *COMPUTE!'s GAZETTE* Programs

Each month, COMPUTE!'s GAZETTE publishes programs for the Commodore 128, 64, Plus/4, and 16. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. All 64 programs run on the 128 in 64 mode. Be sure to read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

We frequently publish two programs designed to make typing easier: The Automatic Proofreader, and MLX, designed for entering machine language programs.

When entering a BASIC program, be especially careful with DATA statements as they are extremely sensitive to errors. A mistyped number in a DATA statement can cause your machine to "lock up" (you'll have no control over the computer). If this happens, the only recourse is to turn your computer off then on, erasing what was in memory. So be sure to *save a program before you run it.* If your computer crashes, you can always reload the program and look for the error.

Special Characters

Most of the programs listed in each issue contain special control characters. To facilitate typing in any programs from the GAZETTE, use the following listing conventions.

The most common type of control characters in our listings appear as words within braces: {DOWN} means to press the cursor down key; {5 SPACES} means to press the space bar five times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing another key), the character is underlined. For example, A means hold down the SHIFT key and press A. You may see strange characters on your screen, but that's to be expected. If you find a number followed by an underlined key enclosed in braces (for example, {8 A}), type the key as many times as indicated (in our example, enter eight SHIFTed A's).

If a key is enclosed in special brackets, [ ], hold down the Commodore key (at the lower left corner of the keyboard) and press the indicated character.

Rarely, you'll see a single letter of the alphabet enclosed in braces. This can be entered on the Commodore 64 by pressing the CTRL key while typing the letter in braces. For example, {A} means to press CTRL-A.

The Quote Mode

Although you can move the cursor around the screen with the CRSR keys, often a programmer will want to move the cursor under program control. This is seen in examples such as {LEFT}, and {HOME} in the program listings. The only way the computer can tell the difference between direct and programmed cursor control is *the quote mode.*

Once you press the quote key, you're in quote mode. This mode can be confusing if you mistype a character and cursor left to change it. You'll see a reverse video character (a graphics symbol for cursor left). In this case, you can use the DELete key to back up and edit the line. Type another quote and you're out of quote mode. If things really get confusing, you can exit quote mode simply by pressing RETURN. Then just cursor up to the mistyped line and fix it.

When You Read:	Press:	See:
{CLR}	SHIFT + CLR/HOME	
{HOME}	CLR/HOME	
{UP}	SHIFT + ↑ CRSR ↓	
{DOWN}	↑ CRSR ↓	
{LEFT}	SHIFT + ← CRSR →	
{RIGHT}	← CRSR →	
{RVS}	CTRL + 9	
{OFF}	CTRL + 0	
{BLK}	CTRL + 1	
{WHT}	CTRL + 2	
{RED}	CTRL + 3	
{CYN}	CTRL + 4	

When You Read:	Press:	See:
{PUR}	CTRL + 5	
{GRN}	CTRL + 6	
{BLU}	CTRL + 7	
{YEL}	CTRL + 8	
{ F1 }	f1	
{ F2 }	SHIFT + f1	
{ F3 }	f3	
{ F4 }	SHIFT + f3	
{ F5 }	f5	
{ F6 }	SHIFT + f5	
{ F7 }	f7	
{ F8 }	SHIFT + f7	

When You Read:	Press:	See:
←	←	
↑	SHIFT + ↑	

For Commodore 64 Only

[1]	COMMODORE + 1	
[2]	COMMODORE + 2	
[3]	COMMODORE + 3	
[4]	COMMODORE + 4	
[5]	COMMODORE + 5	
[6]	COMMODORE + 6	
[7]	COMMODORE + 7	
[8]	COMMODORE + 8	

The Automatic Proofreader

Philip I. Nelson, Assistant Editor

"The Automatic Proofreader" helps you type in program listings for the 128, 64, Plus/4, and 16 and prevents nearly every kind of typing mistake.

Type in the Proofreader *exactly* as listed. Since the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unfamiliar commands. After finishing, save a copy or two on disk or tape before running it. This is important because the Proofreader erases the BASIC portion of itself when you run it, leaving only the machine language portion in memory.

Next, type RUN and press RETURN. After announcing which computer it's running on, the Proofreader displays the message "Proofreader Active". Now you're ready to type in a BASIC program.

Every time you finish typing a line and press RETURN, the Proofreader displays a two-letter checksum in the upper-left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, it's almost certain the line was typed correctly. If the letters don't match, check for your mistake and correct the line.

The Proofreader ignores spaces not enclosed in quotes, so you can omit or add spaces between keywords and still see a matching checksum. However, since spaces inside quotes are almost always significant, the Proofreader pays attention to them. For example, **10 PRINT"THIS IS BASIC"** will generate a different checksum than **10 PRINT"THIS ISBA SIC"**.

A common typing error is transposition—typing two successive characters in the wrong order, like PIRNT instead of PRINT or 64378 instead of 64738. The Proofreader is sensitive to the *position* of each character within the line and thus catches transposition errors.

The Proofreader does *not* accept keyword abbreviations (for example, ? instead of PRINT). If you prefer to use abbreviations, you can still check the line by LISTing it after typing it in, moving the cursor back to the line, and pressing RETURN. LISTing the line substitutes the full keyword for the abbreviation and allows the Proofreader to work properly. The same technique works for rechecking programs you've already typed in.

If you're using the Proofreader on the Commodore 128, Plus/4, or 16, *do not perform any GRAPHIC commands while the Proofreader is active.* When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the Proofreader—to another memory area, causing the Proofreader to crash. The same thing happens if you *run* any program with a GRAPHIC command while the Proofreader is in memory.

Though the Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. However, the Proofreader is purposely difficult to dislodge: It's not affected by tape or disk operations, or by pressing RUN/STOP– RESTORE. The simplest way to disable it is to turn the computer off then on. A gentler method is to SYS to the computer's built-in reset routine (SYS 65341 for the 128, 64738 for the 64, and 65526 for the Plus/4 and 16). These reset routines erase any program in memory, so be sure to save the program you're typing in before entering the SYS command.

If you own a Commodore 64, you may already have wondered whether the Proofreader works with other programming utilities like "MetaBASIC." The answer is generally yes, *if you're using a 64 and activate the Proofreader after installing the other utility.* For example, first load and activate MetaBASIC, then load and run the Proofreader.

When using the Proofreader with another utility, you should disable *both* programs before running a BASIC program. While the Proofreader seems unaffected by most utilities, there's no way to promise that it will work with any and every combination of utilities you might want to use. The more utilities activated, the more fragile the system becomes.

The New Automatic Proofreader

```
10 VEC=PEEK(772)+256*PEEK(773)
   :LO=43:HI=44
20 PRINT "AUTOMATIC PROOFREADE
   R FOR ";:IF VEC=42364 THEN
   {SPACE}PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VI
   C-20"
40 IF VEC=35158 THEN GRAPHIC C
   LR:PRINT "PLUS/4 & 16"
50 IF VEC=17165 THEN LO=45:HI=
   46:GRAPHIC CLR:PRINT"128"
60 SA=(PEEK(LO)+256*PEEK(HI))+
   6:ADR=SA
70 FOR J=0 TO 166:READ BYT:POK
   E ADR,BYT:ADR=ADR+1:CHK=CHK
   +BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*
   ERROR* CHECK TYPING IN DATA
    STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+L
   F,LB:POKE SA+HF,HB:NEXT
110 IF CHK<>22054 THEN PRINT "
   *ERROR* RELOAD PROGRAM AND
   {SPACE}CHECK FINAL LINE":EN
   D
120 POKE SA+149,PEEK(772):POKE
    SA+150,PEEK(773)
130 IF VEC=17165 THEN POKE SA+
   14,22:POKE SA+18,23:POKESA+
   29,224:POKESA+139,224
140 PRINT CHR$(147);CHR$(17);"
   PROOFREADER ACTIVE":SYS SA
150 POKE HI,PEEK(HI)+1:POKE (P
   EEK(LO)+256*PEEK(HI))-1,0:N
   EW
160 DATA 120,169,73,141,4,3,16
   9,3,141,5,3
170 DATA 88,96,165,20,133,167,
   165,21,133,168,169
180 DATA 0,141,0,255,162,31,18
   1,199,157,227,3
190 DATA 202,16,248,169,19,32,
   210,255,169,18,32
200 DATA 210,255,160,0,132,180
   ,132,176,136,230,180
210 DATA 200,185,0,2,240,46,20
   1,34,208,8,72
220 DATA 165,176,73,255,133,17
   6,104,72,201,32,208
230 DATA 7,165,176,208,3,104,2
   08,226,104,166,180
240 DATA 24,165,167,121,0,2,13
   3,167,165,168,105
250 DATA 0,133,168,202,208,239
   ,240,202,165,167,69
260 DATA 168,72,41,15,168,185,
   211,3,32,210,255
270 DATA 104,74,74,74,74,168,1
   85,211,3,32,210
280 DATA 255,162,31,189,227,3,
   149,199,202,16,248
290 DATA 169,146,32,210,255,76
   ,86,137,65,66,67
300 DATA 68,69,70,71,72,74,75,
   77,80,81,82,83,88
310 DATA 13,2,7,167,31,32,151,
   116,117,151,128,129,167,136
   ,137
```

MLX Machine Language Entry Program For Commodore 64 and 128

Ottis R. Cowper, Technical Editor

"MLX" is a labor-saving utility that allows almost fail-safe entry of machine language programs. Included are versions for the Commodore 64 and 128.

Type in and save some copies of whichever version of MLX is appropriate for your computer (you'll want to use it to enter future ML programs from COMPUTE!'s GAZETTE). Program 1 is for the Commodore 64, and Program 2 is for the 128 (128 MLX can also be used to enter Commodore 64 ML programs for use in 64 mode). When you're ready to enter an ML program, load and run MLX. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing.

If you're unfamiliar with machine language, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0–9 and the letters A–F. But don't worry—even if you know nothing about ML or hex, you should have no trouble using MLX.

After you enter the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option.

A functions menu will appear. The first option in the menu is ENTER DATA. If you're just starting to type in a program, pick this. Press the E key, and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you left off typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. If you pressed E by mistake, you can return to the command menu by pressing RETURN alone when asked for the address. (You can get back to the menu from most options by pressing RETURN with no other input.)

Entering A Listing

Once you're in Enter mode, MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an MLX-format listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows MLX to check your typing. (Commodore 128 users *can* enter the data from an MLX listing using the built-in monitor if the rightmost column of data is omitted, but we recommend against it. It's much easier to let MLX do the proofreading and error checking for you.)

When you enter a line, MLX recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if MLX detects a typing error, you'll hear a low buzz and see an error message. The line will then be redisplayed for editing.

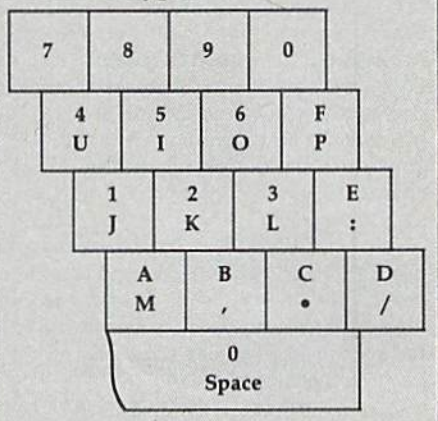
Invalid Characters Banned

Only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* type spaces between the columns; MLX automatically inserts these for you. You *do not* press RETURN after typing the last number in a line; MLX automatically enters and checks the line after you type the last digit.

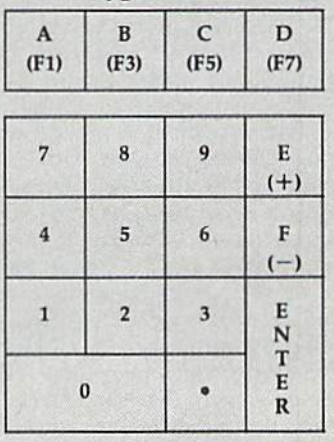
Only the numerals 0–9 and the letters A–F can be typed in. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, 128 MLX redefines the function keys and + and − keys on the numeric keypad so that you can enter data one-handed. (The 64 version incorporates the keypad modification from the March 1986 "Bug-Swatter" column, lines 485–487.) In either case, the keypad is active only while entering data. Addresses must be entered with the normal letter and number keys. The figures above show the keypad configurations for each version.

MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, MLX will catch your mistake. There is one error that can slip past MLX: Because of the checksum formula used, MLX won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take reasonable care while entering data.

64 MLX Keypad



128 MLX Keypad



Editing Features

To correct typing mistakes before finishing a line, use the INST/DEL key to delete the character to the left of the cursor. (The cursor-left key also deletes.) If you mess up a line really badly, press CLR/HOME to start the line over. The RETURN key is also active, but only before any data is typed on a line. Pressing RETURN at this point returns you to the command menu. After you type a character of data, MLX disables RETURN until the cursor returns to the start of a line. Remember, you can press CLR/HOME to quickly get to a line

number prompt.

More editing features are available when correcting lines in which MLX has detected an error. To make corrections in a line that MLX has redisplayed for editing, compare the line on the screen with the one printed in the listing, then move the cursor to the mistake and type the correct key. The cursor left and right keys provide the normal cursor controls. (The INST/DEL key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, RETURN is active; pressing it tells MLX to recheck the line. You can press the CLR/HOME key to clear the entire line if you want to start from scratch, or if you want to get to a line number prompt to use RETURN to get back to the menu.

Display Data

The second menu choice, DISPLAY DATA, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, MLX asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. MLX displays program lines until it reaches the end of the program, at which point the menu is redisplayed. You can pause the display by pressing the space bar. (MLX finishes printing the current line before halting.) Press space again to restart the display. To break out of the display and get back to the menu before the ending address is reached, press RETURN.

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are SAVE FILE and LOAD FILE; their operation is quite straightforward. When you press S or L, MLX asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save (save only for the 128 version). Don't panic; this is normal behavior. MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands (128 MLX makes use of BLOAD). Disk users should also note that the drive prefix 0: is automatically added to the filename (line 750 in 64 MLX), so this should *not* be included when entering the name. This also precludes the use of @ for Save-with-Replace, so remember to give each version you save a different name. The 128 version makes up for this by giving you the option of scratching the existing file if you want to reuse a filename.

Remember that MLX saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When saving a partially completed listing, make sure to note the address where you stopped typing so you'll know where to resume entry when you reload.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. (Tape users should bear in mind that Commodore computers are never able to detect errors during a save to tape.) MLX also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran MLX; LOAD ENDED AT *address*, which means the file you're trying to load ends before the ending address you specified when you started MLX; and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you specified when you started MLX. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct starting and ending addresses.

The 128 version also has a CATALOG DISK option so you can view the contents of the disk directory before saving or loading.

The QUIT menu option has the obvious effect—it stops MLX and enters BASIC. The RUN/STOP key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, RUN/STOP-RESTORE also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the clear workspace option.

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. Some ML programs are designed to be loaded and run like BASIC programs, so all you need to type is LOAD *"filename"*,8 for disk (DLOAD *"filename"* on the 128) or LOAD *"filename"*,1,1 for tape, and then RUN. Such programs will usually have a starting address of 0801 for the 64 or 1C01 for the 128. Other programs must be reloaded to specific addresses with a command such as LOAD *"filename"*,8,1 for disk (BLOAD *"filename"* on the 128) or LOAD *"filename"*,1,1 for tape, then started with a SYS to a particular memory address. On the Commodore 64, the most common starting address for such programs is 49152, which corresponds to MLX address C000. In either case, you should always refer to the article which accompanies the ML listing for information on loading and running the program.

An Ounce Of Prevention

By the time you finish typing in the data for a long ML program, you may have several hours invested in the project. Don't take chances—use our "Automatic Proofreader" to type the new MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses, then use the Display option to verify that the data has been entered correctly. And be sure to test the Save and Load options several times to ensure that you can recall your work from disk or tape. Don't let a simple typing error in the new MLX cost you several nights of hard work.

Program 1: MLX For Commodore 64

```
SS 10 REM VERSION 1.1: LINES 8
      30,950 MODIFIED, LINES 4
      85-487 ADDED
EK 100 POKE 56,50:CLR:DIM IN$,
       I,J,A,B,A$,B$,A(7),N$
DM 110 C4=48:C6=16:C7=7:Z2=2:Z
       4=254:Z5=255:Z6=256:Z7=
       127
CJ 120 FA=PEEK(45)+Z6*PEEK(46)
       :BS=PEEK(55)+Z6*PEEK(56
       ):H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}"
       :S$=" ":D$=CHR$(20):Z$=
       CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD
       +23:POKE I,0:NEXT:POKE
       {SPACE}SD+24,15:POKE 78
       8,52
FC 150 PRINT"{CLR}"CHR$(142)CH
       R$(8):POKE 53280,15:POK
       E 53281,15
EJ 160 PRINT T$" {RED}{RVS}
       {2 SPACES}{8 @}
       {2 SPACES}"SPC(28)"
       {2 SPACES}{OFF}{BLU} ML
       X II {RED}{RVS}
       {2 SPACES}"SPC(28)"
       {12 SPACES}{BLU}"
FR 170 PRINT"{3 DOWN}
       {3 SPACES}COMPUTE!'S MA
       CHINE LANGUAGE EDITOR
       {3 DOWN}"
JB 180 PRINT"{BLK}STARTING ADD
```

```
      RESS[4]";:GOSUB300:SA=AD:GOSUB1040:IF F THEN180
GF 190 PRINT"{BLK}{2 SPACES}ENDING ADDRESS[4]";:GOSUB300:EA=AD:GOSUB1030:IF {SPACE}F THEN190
KR 200 INPUT"{3 DOWN}{BLK}CLEAR WORKSPACE [Y/N][4]";A$:IF LEFT$(A$,1)<>"Y"THEN220
PG 210 PRINT"{2 DOWN}{BLU}WORKING...";:FORI=BS TO BS+EA-SA+7:POKE I,0:NEXT:PRINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}{BLK}{RVS} MLX COMMAND {SPACE}MENU {DOWN}[4]":PRINT T$"{RVS}E{OFF}NTER DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISPLAY DATA":PRINT T$"{RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE FILE":PRINT T$"{RVS}Q{OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=MID$("EDLSQ",I,1)THEN A=I:I=5
FD 270 NEXT:ON A GOTO420,610,690,700,280:GOSUB1060:GOTO250
EJ 280 PRINT"{RVS} QUIT ":INPUT"{DOWN}[4]ARE YOU SURE [Y/N]";A$:IF LEFT$(A$,1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF LEN(IN$)<>4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$=MID$(IN$,3):GOSUB320:AD=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID$(B$,J,1):B=ASC(A$)-C4+(A$>"@")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(H$,B+1,1);:B=A-B*C6:PRINT MID$(H$,B+1,1);:RETURN
RR 360 A=INT(AD/Z6):GOSUB350:A=AD-A*Z6:GOSUB350:PRINT";";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*CK+Z5*(CK>Z7):GOTO390
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT [4]";:GOSUB300:IF IN$<>N$ THEN GOSUB1030:IF F {SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA {SPACE}":GOSUB400:IF IN$=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F THEN PRINT IN$:PRINT"{UP}{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:B$=S$:FOR J=1 TO 2:IF F THEN B$=MID$(IN$,I+J,1)
HA 460 PRINT"{RVS}"B$L$;:IF I<24THEN PRINT"{OFF}";
HD 470 GET A$:IF A$=N$ THEN470
FK 480 IF(A$>"/"ANDA$<":")OR(A$>"@"ANDA$<"G")THEN540
GS 485 A=-(A$="M")-2*(A$=",")-3*(A$=".")-4*(A$="/")-5*(A$="J")-6*(A$="K")
FX 486 A=A-7*(A$="L")-8*(A$=";")-9*(A$="U")-10*(A$="I")-11*(A$="O")-12*(A$="P")
CM 487 A=A-13*(A$=S$):IF A THEN A$=MID$("ABCD123E456F0",A,1):GOTO 540
MP 490 IF A$=R$ AND((I=0)AND(J=1)OR F)THEN PRINT B$;:J=2:NEXT:I=24:GOTO550
KC 500 IF A$="{HOME}" THEN PRINT B$:J=2:NEXT:I=24:NEXT:F=0:GOTO440
MX 510 IF(A$="{RIGHT}")ANDF THENPRINT B$L$;:GOTO540
GK 520 IF A$<>L$ AND A$<>D$ OR ((I=0)AND(J=1))THEN GOSUB1060:GOTO470
HG 530 A$=L$+S$+L$:PRINT B$L$;:J=2-J:IF J THEN PRINT {SPACE}L$;:I=I-3
QS 540 PRINT A$;:NEXT J:PRINT {SPACE}S$;
PM 550 NEXT I:PRINT:PRINT"{UP}{5 RIGHT}";:INPUT#3,IN$:IF IN$=N$ THEN CLOSE3:GOTO220
QC 560 FOR I=1 TO 25 STEP3:B$=MID$(IN$,I):GOSUB320:IF I<25 THEN GOSUB380:A(I/3)=A
PK 570 NEXT:IF A<>CK THEN GOSUB1060:PRINT"{BLK}{RVS}{SPACE}ERROR: REENTER LINE [4]":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FOR I=0 TO 7:POKE B+I,A(I):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN CLOSE3:PRINT"{DOWN}{BLU}** END OF ENTRY **{BLK}{2 DOWN}":GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"{CLR}{DOWN}{RVS}{SPACE}DISPLAY DATA ":GOSUB400:IF IN$=N$ THEN220
RJ 620 PRINT"{DOWN}{BLU}PRESS: {RVS}SPACE{OFF} TO PAUSE, {RVS}RETURN{OFF} TO BREAK[4]{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FOR I=BTO B+7:A=PEEK(I):GOSUB350:GOSUB380:PRINT S$;
CC 640 NEXT:PRINT"{RVS}";:A=CK:GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA THENPRINT"{DOWN}{BLU}** END OF DATA **":GOTO220
KC 660 GET A$:IF A$=R$ THEN GOSUB1080:GOTO220
EQ 670 IF A$=S$ THEN F=F+1:GOSUB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"{DOWN}{RVS} LOAD {SPACE}DATA ":OP=1:GOTO710
PC 700 PRINT"{DOWN}{RVS} SAVE {SPACE}FILE ":OP=0
RX 710 IN$=N$:INPUT"{DOWN}FILENAME[4]";IN$:IF IN$=N$ {SPACE}THEN220
PR 720 F=0:PRINT"{DOWN}{BLK}{RVS}T{OFF}APE OR {RVS}D{OFF}ISK: [4]";
FP 730 GET A$:IF A$="T"THEN PRINT"T{DOWN}":GOTO880
HQ 740 IF A$<>"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8,15,"I0:":B=EA-SA:IN$=0:"+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+",P,W":GOSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(AH*256):PRINT#1,CHR$(AL);CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CHR$(PEEK(BS+I));:IF ST THEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOTO940
GS 800 GOSUB1060:PRINT"{DOWN}{BLK}ERROR DURING SAVE:[4]":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+",P,R":GOSUB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z$)+256*ASC(B$+Z$):IF AD<>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,A$:POKE BS+I,ASC(A$+Z$):IF(I<>B)AND ST THEN F=2:AD=I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F>0)+1 GOTO960,970
SA 860 INPUT#15,A,A$:IF A THEN CLOSE1:CLOSE15:GOSUB1060:PRINT"{RVS}ERROR: "A$
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE187,PEEK(FA+3):POKE188,PEEK(FA+4):IFOP=0THEN920
HJ 890 SYS 63466:IF(PEEK(783)AND1)THEN GOSUB1060:PRINT"{DOWN}{RVS} FILE NOT {SPACE}FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(830):IF AD<>SA THEN F=1:GOTO970
SC 910 A=PEEK(831)+256*PEEK(832)-1:F=F-2*(A<EA)-3*(A>EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:POKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOSUB1010:ON OP GOTO950:SYS 63591
AE 940 GOSUB1080:PRINT"{BLU}** SAVE COMPLETED **":GOTO220
XP 950 POKE147,0:SYS 63562:IF {SPACE}ST>0 THEN970
FR 960 GOSUB1080:PRINT"{BLU}** LOAD COMPLETED **":GOTO220
DP 970 GOSUB1060:PRINT"{BLK}{RVS}ERROR DURING LOAD:{DOWN}[4]":ON F GOSUB980,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTING ADDRESS (";:GOSUB360:PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT ";:AD=SA+AD:GOSUB360:PRINT D$:RETURN
FD 1000 PRINT"TRUNCATED AT ENDING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH*256):POKE193,AL:POKE194,AH
FF 1020 AH=INT(B/256):AL=B-(AH*256):POKE174,AL:POKE175,AH:RETURN
FX 1030 IF AD<SA OR AD>EA THEN1050
HA 1040 IF(AD>511 AND AD<40960
```

```
        )OR(AD>49151 AND AD<53
        248)THEN GOSUB1080:F=0
        :RETURN
HC 1050 GOSUB1060:PRINT"{RVS}
        {SPACE}INVALID ADDRESS
         {DOWN}{BLK}":F=1:RETU
        RN
AR 1060 POKE SD+5,31:POKE SD+6
        ,208:POKE SD,240:POKE
        {SPACE}SD+1,4:POKE SD+
        4,33
DX 1070 FOR S=1 TO 100:NEXT:GO
        TO1090
PF 1080 POKE SD+5,8:POKE SD+6,
        240:POKE SD,0:POKE SD+
        1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:PO
        KE SD+4,0:POKE SD,0:PO
        KE SD+1,0:RETURN
```

Program 2: MLX For Commodore 128

```
AE 100 TRAP 960:POKE 4627,128:
       DIM NL$,A(7)
XP 110 Z2=2:Z4=254:Z5=255:Z6=2
       56:Z7=127:BS=256*PEEK(4
       627):EA=65280
FB 120 BE$=CHR$(7):RT$=CHR$(13
       ):DL$=CHR$(20):SP$=CHR$
       (32):LF$=CHR$(157)
KE 130 DEF FNHB(A)=INT(A/256):
       DEF FNLB(A)=A-FNHB(A)*2
       56:DEF FNAD(A)=PEEK(A)+
       256*PEEK(A+1)
JB 140 KEY 1,"A":KEY 3,"B":KEY
        5,"C":KEY 7,"D":VOL 15
       :IF RGR(0)=5 THEN FAST
FJ 150 PRINT"{CLR}"CHR$(142);C
       HR$(8):COLOR 0,15:COLOR
        4,15:COLOR 6,15
GQ 160 PRINT TAB(12)"{RED}
       {RVS}{2 SPACES}[9 @]
       {2 SPACES}"RT$;TAB(12)"
       {RVS}{2 SPACES}{OFF}
       {BLU} 128 MLX {RED}
       {RVS}{2 SPACES}"RT$;TAB
       (12)"{RVS}{13 SPACES}
       {BLU}"
FE 170 PRINT"{2 DOWN}
       {3 SPACES}COMPUTE!'S MA
       CHINE LANGUAGE EDITOR
       {2 DOWN}"
DK 180 PRINT"{BLK}STARTING ADD
       RESS[43]";:GOSUB 260:IF
       {SPACE}AD THEN SA=AD:EL
       SE 180
FH 190 PRINT"{BLK}{2 SPACES}EN
       DING ADDRESS[43]";:GOSUB
        260:IF AD THEN EA=AD:E
       LSE 190
MF 200 PRINT"{DOWN}{BLK}CLEAR
       {SPACE}WORKSPACE [Y/N]?
       [43]":GETKEY A$:IF A$<>"
       Y" THEN 220
QH 210 PRINT"{DOWN}{BLU}WORKIN
       G...";:BANK 0:FOR A=BS
       {SPACE}TO BS+(EA-SA)+7:
       POKE A,0:NEXT A:PRINT"D
       ONE"
DC 220 PRINT TAB(10)"{DOWN}
       {BLK}{RVS} MLX COMMAND
       {SPACE}MENU [43]{DOWN}":
       PRINT TAB(13)"{RVS}E
       {OFF}NTER DATA"RT$;TAB(
       13)"{RVS}D{OFF}ISPLAY D
       ATA"RT$;TAB(13)"{RVS}L
       {OFF}OAD FILE"
HB 230 PRINT TAB(13)"{RVS}S
       {OFF}AVE FILE"RT$;TAB(1
       3)"{RVS}C{OFF}ATALOG DI
       SK"RT$;TAB(13)"{RVS}Q
       {OFF}UIT{DOWN}{BLK}"
AP 240 GETKEY A$:A=INSTR("EDLS
       CQ",A$):ON A GOTO 340,5
       50,640,650,930,940:GOSU
       B 950:GOTO 240
SX 250 PRINT"STARTING AT";:GOS
       UB 260:IF(AD<>0)OR(A$=N
       L$)THEN RETURN:ELSE 250
BG 260 A$=NL$:INPUT A$:IF LEN(
       A$)=4 THEN AD=DEC(A$)
PP 270 IF AD=0 THEN BEGIN:IF A
       $<>NL$ THEN 300:ELSE RE
       TURN:BEND
MA 280 IF AD<SA OR AD>EA THEN
       {SPACE}300
PM 290 IF AD>511 AND AD<65280
       {SPACE}THEN PRINT BE$;:
       RETURN
SQ 300 GOSUB 950:PRINT"{RVS} I
       NVALID ADDRESS {DOWN}
       {BLK}":AD=0:RETURN
RD 310 CK=FNHB(AD):CK=AD-Z4*CK
       +Z5*(CK>Z7):GOTO 330
DD 320 CK=CK*Z2+Z5*(CK>Z7)+A
AH 330 CK=CK+Z5*(CK>Z5):RETURN
QD 340 PRINT BE$;"{RVS} ENTER
       {SPACE}DATA ":GOSUB 250
       :IF A$=NL$ THEN 220
JA 350 BANK 0:PRINT:F=0:OPEN 3
       ,3
BR 360 GOSUB 310:PRINT HEX$(AD
       )+":";:IF F THEN PRINT
       {SPACE}L$:PRINT"{UP}
       {5 RIGHT}";
QA 370 FOR I=0 TO 24 STEP 3:B$
       =SP$:FOR J=1 TO 2:IF F
       {SPACE}THEN B$=MID$(L$,
       I+J,1)
PS 380 PRINT"{RVS}"B$+LF$;:IF
       {SPACE}I<24 THEN PRINT"
       {OFF}";
RC 390 GETKEY A$:IF (A$>"/" AN
       D A$<":") OR(A$>"@" AND
        A$<"G") THEN 470
AC 400 IF A$="+" THEN A$="E":G
       OTO 470
QB 410 IF A$="-" THEN A$="F":G
       OTO 470
FB 420 IF A$=RT$ AND ((I=0) AN
       D (J=1) OR F) THEN PRIN
       T B$;:J=2:NEXT:I=24:GOT
       O 480
RD 430 IF A$="{HOME}" THEN PRI
       NT B$:J=2:NEXT:I=24:NEX
       T:F=0:GOTO 360
XB 440 IF (A$="{RIGHT}") AND F
        THEN PRINT B$+LF$;:GOT
       O 470
JP 450 IF A$<>LF$ AND A$<>DL$
       {SPACE}OR ((I=0) AND (J
       =1)) THEN GOSUB 950:GOT
       O 390
PS 460 A$=LF$+SP$+LF$:PRINT B$
       +LF$;:J=2-J:IF J THEN P
       RINT LF$;:I=I-3
GB 470 PRINT A$;:NEXT J:PRINT
       {SPACE}SP$;
HA 480 NEXT I:PRINT:PRINT"{UP}
       {5 RIGHT}";:L$="
       {27 SPACES}"
DP 490 FOR I=1 TO 25 STEP 3:GE
       T#3,A$,B$:IF A$=SP$ THE
       N I=25:NEXT:CLOSE 3:GOT
       O 220
BA 500 A$=A$+B$:A=DEC(A$):MID$
       (L$,I,2)=A$:IF I<25 THE
       N GOSUB 320:A(I/3)=A:GE
       T#3,A$
AR 510 NEXT I:IF A<>CK THEN GO
       SUB 950:PRINT:PRINT"
       {RVS} ERROR: REENTER LI
       NE ":F=1:GOTO 360
DX 520 PRINT BE$:B=BS+AD-SA:FO
       R I=0 TO 7:POKE B+I,A(I
       ):NEXT I
XB 530 F=0:AD=AD+8:IF AD<=EA T
       HEN 360
CA 540 CLOSE 3:PRINT"{DOWN}
       {BLU}** END OF ENTRY **
       {BLK}{2 DOWN}":GOTO 650
MC 550 PRINT BE$;"{CLR}{DOWN}
       {RVS} DISPLAY DATA ":GO
       SUB 250:IF A$=NL$ THEN
       {SPACE}220
JF 560 BANK 0:PRINT"{DOWN}
       {BLU}PRESS: {RVS}SPACE
       {OFF} TO PAUSE, {RVS}RE
       TURN{OFF} TO BREAK[43]
       {DOWN}"
XA 570 PRINT HEX$(AD)+":";:GOS
       UB 310:B=BS+AD-SA
DJ 580 FOR I=B TO B+7:A=PEEK(I
       ):PRINT RIGHT$(HEX$(A),
       2);SP$;:GOSUB 320:NEXT
       {SPACE}I
XB 590 PRINT"{RVS}";RIGHT$(HEX
       $(CK),2)
GR 600 F=1:AD=AD+8:IF AD>EA TH
       EN PRINT"{BLU}** END OF
        DATA **":GOTO 220
EB 610 GET A$:IF A$=RT$ THEN P
       RINT BE$:GOTO 220
QK 620 IF A$=SP$ THEN F=F+1:PR
       INT BE$;
XS 630 ON F GOTO 570,610,570
RF 640 PRINT BE$"{DOWN}{RVS} L
       OAD DATA ":OP=1:GOTO 66
       0
BP 650 PRINT BE$"{DOWN}{RVS} S
       AVE FILE ":OP=0
DM 660 F=0:F$=NL$:INPUT"FILENA
       ME[43]";F$:IF F$=NL$ THE
       N 220
RF 670 PRINT"{DOWN}{BLK}{RVS}T
       {OFF}APE OR {RVS}D{OFF}
       ISK: [43]";
SQ 680 GETKEY A$:IF A$="T" THE
       N 850:ELSE IF A$<>"D" T
       HEN 680
SP 690 PRINT"DISK{DOWN}":IF OP
        THEN 760
EG 700 DOPEN#1,(F$+",P"),W:IF
       {SPACE}DS THEN A$=DS$:G
       OTO 740
JH 710 BANK 0:POKE BS-2,FNLB(S
       A):POKE BS-1,FNHB(SA):P
       RINT"SAVING ";F$:PRINT
MC 720 FOR A=BS-2 TO BS+EA-SA:
       PRINT#1,CHR$(PEEK(A));:
       IF ST THEN A$="DISK WRI
       TE ERROR":GOTO 750
GC 730 NEXT A:CLOSE 1:PRINT"
       {BLU}** SAVE COMPLETED
       {SPACE}WITHOUT ERRORS *
       *":GOTO 220
RA 740 IF DS=63 THEN BEGIN:CLO
       SE 1:INPUT"{BLK}REPLACE
        EXISTING FILE [Y/N][43]
       ";A$:IF A$="Y" THEN SCR
       ATCH(F$):PRINT:GOTO 700
       :ELSE PRINT"{BLK}":GOTO
        660:BEND
GA 750 CLOSE 1:GOSUB 950:PRINT
       "{BLK}{RVS} ERROR DURIN
       G SAVE: [43]":PRINT A$:G
       OTO 220
FD 760 DOPEN#1,(F$+",P"):IF DS
        THEN A$=DS$:F=4:CLOSE
       {SPACE}1:GOTO 790
```

```
PX 770 GET#1,A$,B$:CLOSE 1:AD=
       ASC(A$)+256*ASC(B$):IF
       {SPACE}AD<>SA THEN F=1:
       GOTO 790
KB 780 PRINT"LOADING ";F$:PRIN
       T:BLOAD(F$),B0,P(BS):AD
       =SA+FNAD(174)-BS-1:F=-2
       *(AD<EA)-3*(AD>EA)
RQ 790 IF F THEN 800:ELSE PRIN
       T"{BLU}** LOAD COMPLETE
       D WITHOUT ERRORS **":GO
       TO 220
ER 800 GOSUB 950:PRINT"{BLK}
       {RVS} ERROR DURING LOAD
       : £4}":ON F GOSUB 810,8
       20,830,840:GOTO220
QJ 810 PRINT"INCORRECT STARTIN
       G ADDRESS (";HEX$(AD);"
       )":RETURN
DP 820 PRINT"LOAD ENDED AT ";H
       EX$(AD):RETURN
EB 830 PRINT"TRUNCATED AT ENDI
       NG ADDRESS ("HEX$(EA)")
       ":RETURN
FP 840 PRINT"DISK ERROR ";A$:R
       ETURN
KS 850 PRINT"TAPE":AD=POINTER(
       F$):BANK 1:A=PEEK(AD):A
       L=PEEK(AD+1):AH=PEEK(AD
       +2)
XX 860 BANK 15:SYS DEC("FF68")
       ,0,1:SYS DEC("FFBA"),1,
       1,0:SYS DEC("FFBD"),A,A
       L,AH:SYS DEC("FF90"),12
       8:IF OP THEN 890
FG 870 PRINT:A=SA:B=EA+1:GOSUB
        920:SYS DEC("E919"),3:
       PRINT"SAVING ";F$
AB 880 A=BS:B=BS+(EA-SA)+1:GOS
       UB 920:SYS DEC("EA18"):
       PRINT"{DOWN}{BLU}** TAP
       E SAVE COMPLETED **":GO
       TO 220
CP 890 SYS DEC("E99A"):PRINT:I
       F PEEK(2816)=5 THEN GOS
       UB 950:PRINT"{DOWN}
       {BLK}{RVS} FILE NOT FOU
       ND ":GOTO 220
GQ 900 PRINT"LOADING ...{DOWN}
       ":AD=FNAD(2817):IF AD<>
       SA THEN F=1:GOTO 800:EL
       SE AD=FNAD(2819)-1:F=-2
       *(AD<EA)-3*(AD>EA)
JD 910 A=BS:B=BS+(EA-SA)+1:GOS
       UB 920:SYS DEC("E9FB"):
       IF ST>0 THEN 800:ELSE 7
       90
XB 920 POKE193,FNLB(A):POKE194
       ,FNHB(A):POKE 174,FNLB(
       B):POKE 175,FNHB(B):RET
       URN
CP 930 CATALOG:PRINT"{DOWN}
       {BLU}** PRESS ANY KEY F
       OR MENU **":GETKEY A$:G
       OTO 220
MM 940 PRINT BE$"{RVS} QUIT
       £4}";RT$;"ARE YOU SURE
       {SPACE}[Y/N]?":GETKEY A
       $:IF A$<>"Y" THEN 220:E
       LSE PRINT"{CLR}":BANK 1
       5:END
JE 950 SOUND 1,500,10:RETURN
AF 960 IF ER=14 AND EL=260 THE
       N RESUME 300
MK 970 IF ER=14 AND EL=500 THE
       N RESUME NEXT
KJ 980 IF ER=4 AND EL=780 THEN
        F=4:A$=DS$:RESUME 800
DQ 990 IF ER=30 THEN RESUME:EL
       SE PRINT ERR$(ER);" ERR
       OR IN LINE";EL
```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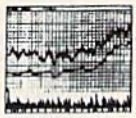

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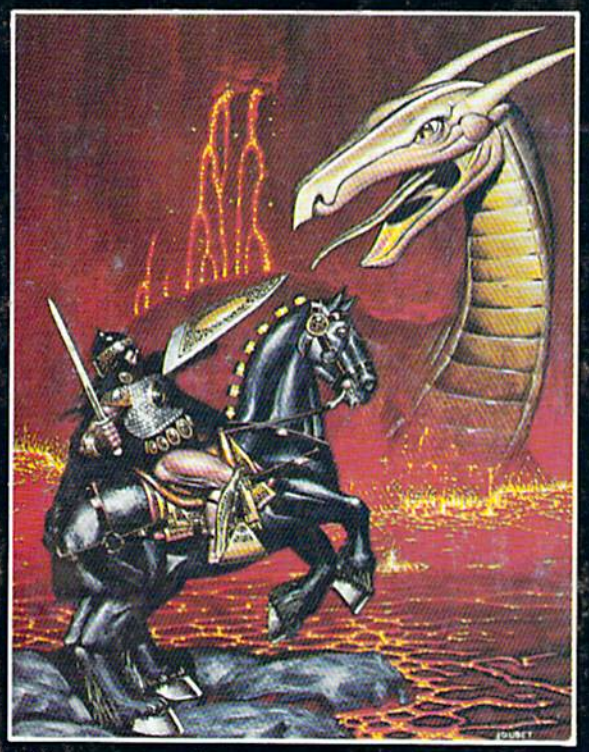

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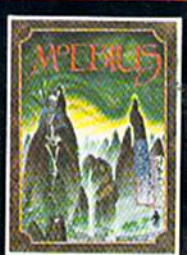

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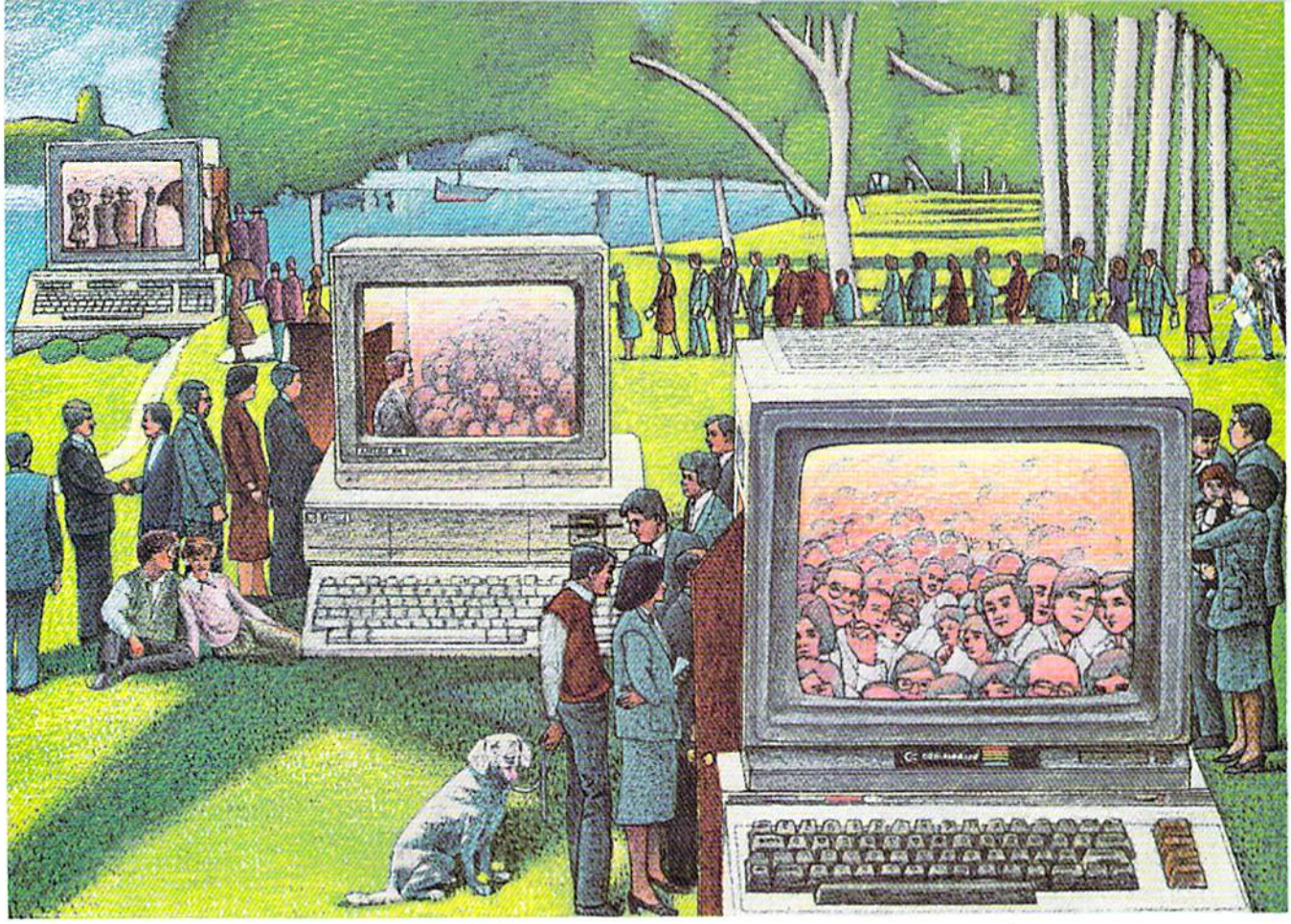

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